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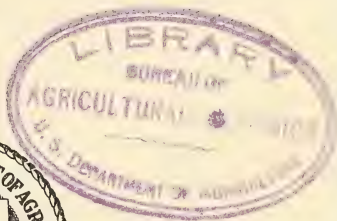
REPORT *of* THE
SECRETARY OF
AGRICULTURE
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UNITED STATES
GOVERNMENT PRINTING OFFICE
WASHINGTON: 1934

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REPORT OF THE SECRETARY OF AGRICULTURE, 1934

WASHINGTON, D. C., *December 12, 1934.*

To the PRESIDENT:

TOWARD A BALANCED ABUNDANCE

Experiments of interest and concern to the public usually meet with objections from opposite poles. Some people say the experiments will not work, and others that they will work too well. It was said of Stevenson's locomotive that it would not run and that it would run too fast. It was said of the Agricultural Adjustment Act that it would not control production and that it would control production to the point of scarcity. Two seasons of trial have disposed of the first objection. Everyone now recognizes that in the combination of benefit payments and processing taxes agriculture has an effective means of adjusting its production to the needs of the market, a method which overcomes the obstacles that wrecked all previous efforts to accomplish that end. This new method rewards principally those who take part in production adjustments. Previous methods had exactly the opposite result. They benefited outsiders and forced insiders to pay the costs. So successful has the new method proved, that we hear louder than ever the objection that it will work too well for the good of the community, that it creates want and not welfare.

This objection has no better foundation than the one it supplanted. In proof we need simply to review the action taken and the results achieved up to the present; for the story shows why the Agricultural Adjustment Act succeeds in adjusting production to the demand and why it would not succeed were it used to reduce production below that point. Naturally the first steps involved reducing production. In 1933 agriculture had enormous surpluses of wheat, cotton, tobacco, and hog products, which had accumulated as a result of war-time expansion, economic nationalism, strangled foreign trade, the disappearance of foreign markets, and reduced domestic consumption. Prices had fallen far below costs. Merely to avert farm ruin, it was imperative to eliminate the surpluses. As matters then stood, production control seemed to be synonymous with crop reduction. But it was never contemplated that reduction, once started, should be continued indefinitely. The adjustment principle applies not only on the downturn; it may regulate production to a stable or to a rising demand, and may maintain a good balance among farm enterprises. After lessening the bad effects of past mistakes, it may help to prevent new mistakes. It would be a serious mistake to reduce farm

production constantly. Such a course would raise prices temporarily, but would restrict consumption, and create new farm competition at home and abroad.

End of Emergency Adjustments in View

As a matter of fact the end of our period of emergency adjustments, of drastic reductions in the farm output, is coming into view. In the case of some commodities, such as wheat, corn, and hog products, the domestic surpluses have largely disappeared, as a result partly of crop control and partly of weather conditions. As we advance in the adjustment of supply to existing demands, the basic principle of the Agricultural Adjustment Act stands out more clearly. It is production adjustment, which does not mean reducing the production of everything, but producing different commodities in the proper amounts and proportions. Sometimes we need reduction, sometimes expansion. As markets improve, farmers must be ready to increase their output. In doing so, however, they must keep step with the growth of demand and not run ahead of it. They must be on guard against piling up new surpluses. Cooperative action as prescribed in the Agricultural Adjustment Act affords the means.

Adjusting production downward when demand falls is not new. It is the normal, and in fact, the compulsory course. Industry follows it more generally and more successfully than does agriculture. Manufacturers immediately check or cease production when they can no longer sell their goods. They do so largely at the expense of labor, which loses its employment. Agriculture cannot quickly readjust its production downward for reasons familiar to everyone. Disused farms suffer more than disused factories. Planting and livestock breeding are annual matters; factory production can be adjusted almost from day to day. Also, farmers acting individually work at cross purposes. And then, too, when prices fall, some farmers try to recoup by having more bushels or bales or head of livestock to sell. Cooperative planning under Federal guidance can in part overcome these difficulties. It provides a definite mechanism through which farmers can work together for the control of production. Even with this assistance, however, farmers cannot regulate their output as accurately as can manufacturers. Agriculture cannot create scarcity at will, because the motive to keep men and land out of production weakens as surpluses disappear.

Need of Permanent Control

Essentially, agriculture needs production control to prevent the mass swings that lead to recurring cycles of over and under production. Adopted as an emergency device, a means for averting irremediable disaster through quick, concerted reduction of output, the control principle has nevertheless permanent as well as emergency uses. This we can infer from a glance at the conditions that existed in agriculture long before the present depression. Both before and after the war, recurring cycles in production blocked steady farm prosperity. Adjustment to demand through blind competition

caused farmers to rush in and out of different enterprises. Whenever any crop showed a profit, the producers grew more until the profit had been stamped into the ground. They did so to the greatest extent during and after the war; but under so-called free competition they always do so to some degree. Cooperative adjustments offer a means of correcting this normal handicap, as well as of dealing with abnormal surpluses. This use of the adjustment principle is the natural sequel to the emergency adjustments.

We can see the need by glancing at the record of some past production cycles. Thus the hog cycle carried hog slaughter from 62,000,000 in 1920 up to 80,000,000 in 1923, and then down to 66,000,000 in 1926. In the meantime hog prices varied from below \$7 a hundred pounds in 1923 to \$14 in 1926. The beef cycle carried cattle slaughter from 12,000,000 in 1921 to 15,000,000 in 1926 and then down to 12,000,000 again in 1928. Steer prices increased from \$9.20 a hundred pounds in 1926 to \$15 in 1928. A new upward movement in cattle numbers accounts partly for the low cattle prices of recent years. Wide swings in potato production caused prices to fluctuate widely. Between 1926 and 1928 the production increased from 323,000,000 to 427,000,000 bushels and the farm price per bushel declined from \$1.42 to 62 cents. Great swings in cotton acreage were common. From 1922 to 1926 the cotton acreage jumped from 34,000,000 to nearly 49,000,000. The farm prices for cotton varied from 23 cents to 12½ cents a pound in 1926—a very low price for that time. Many other products showed similar fluctuations in production and prices.

Farming would return to these erratic and senseless swings if we dropped the principle of cooperative adjustment. The swings due to weather are wide enough without having them further complicated by human miscalculation. Without means of coordinating their production, farmers could not for long keep a satisfactory balance between production and consumption. They can do so with the machinery provided in the Agricultural Adjustment Act with no risk that production control will lead to monopoly. There are two very strong safeguards: (1) The natural desire of farmers to take advantage of real opportunities for profit; (2) the fact that supply is only one of the factors that determine price. Demand is equally potent. This is particularly true of dairy products, fresh fruit and vegetables, and meats. Cotton prices vary with demand about as much as with supply. In the case of wheat, potatoes, and rice, supply seems to be the dominating price-making factor. But even in the case of these commodities there is a limit to the extent to which farm income can be influenced through supply adjustments. Farm income depends vitally on consumer buying power, and gains hereafter will depend increasingly on industrial recovery. Agriculture cannot achieve prosperity by itself. Such measures as the housing act, the bankruptcy measure to scale down impossibly heavy debts, the Reconstruction Finance Corporation's loans to industries, and recent changes in the N. R. A. price policies are very important to farmers.

Fair Adjustment Retains Consumer's Good Will

That farm recovery depends essentially on adjusting production to market needs rather than always on cutting it down appears in other ways. Removing surpluses benefits both producers and consumers.

It restores fair exchange value to farm products and enables farmers to buy nonfarm goods. Consumers gain nothing in the long run by getting farm goods at less than cost. In one form or another they have to pay the full bill eventually. Agriculture must be maintained; and to maintain it the prices paid for farm products must cover the costs. Consumers do not escape this necessity by not paying the necessary prices immediately. They simply postpone the payment to their disadvantage. What they save on current prices they have to make up in the future. This is so generally recognized that public opinion almost unanimously approves reducing production to remove surpluses. It would not equally approve adjustments toward scarcity. Nonfarmers would instantly rebel, and with reason, for it is one thing to use the power of the Government to win justice for agriculture and quite another to use that power unfairly.

Furthermore, the methods permissible under the Agricultural Adjustment Act do not lend themselves to the creation of scarcity. They make a distinction between the cooperator and the noncooperator in production adjustments. Through a benefit payment on his allotted share of the domestic production, the former receives a greater net income than the latter. In wheat, for example, cooperators reduced their acreage by 15 percent in 1934. With an average yield of 11 bushels, and a farm price the same as last year's, the cooperating farmer stands to get \$855 from 85 acres, while the noncooperating farmer will receive only \$814 from 100 acres. In 1933 the cooperating cotton farmer growing 75 acres received about \$1,707 for the lint. For the lint from 100 acres the noncooperating farmer received only \$1,663. With hogs at an average farm price of \$11 per head, the cooperating farmer, after reducing his corn production by 25 acres and his hog production to 112 head, would take in \$1,938 for his hogs. The noncooperator would receive only \$1,650 for 150 head. In the case of burley tobacco at present prices the signer gets \$750 for the product of 6 acres whereas the nonsigner gets only \$584 for the product of 10 acres. In addition, the cooperating farmers save on fertilizer, twine, and other expenses of production. Obviously, however, the relative advantage would diminish were production reduced enough to send prices skyrocketing. In that event the noncooperator would make more on full production than the cooperator would on restricted production. Soon there would be a new surplus. To reduce production excessively would put a premium on noncooperation, and wreck the project.

Essentials of Permanent Recovery

As already noted, the towering export surpluses are mostly gone. But the 50,000,000 acres formerly devoted to production for the foreign market, though mostly held out of use in 1934, are still in farms. We must not forget the existence of these surplus acres. Normal growing conditions, in the absence of Government help in agricultural adjustment, would build up the farm surpluses again in 2 or 3 years. For the time being, however, it is necessary to focus our attention largely on the disappearance of the farm surpluses, and on the resulting improvement in agricultural prices, particularly in

the prices of the great export crops. To the extent that current price improvement is due to the drought it is impermanent. What are the requirements of permanent farm recovery?

One of the outstanding long-time objectives of the national administration is to lay the foundation for an era of abundance. It is therefore essential that the Agricultural Adjustment Administration, in mapping its policy for 1935 and 1936, should consider to what extent agricultural and national prosperity can be advanced by a restriction of the farm output greater than that necessary to compensate for loss in foreign markets. Can true prosperity be had for agriculture or for the country as a whole by creating domestic shortages or continuously restricting production? Ninety percent of the farmers will say no. Yet some farmers may come to believe that their prosperity depends on man-made scarcity.

In the emergency we had thoroughly unbalanced price and production relationships between agriculture and industry. Prior to 1933 agriculture did not reduce its production appreciably, but city industries reduced their production greatly. From 1929 to the spring of 1933 farm production dropped only about 6 percent while farm prices dropped 63 percent. In the same period the output of farm implements dropped 80 percent, of motor vehicles 80, of cement 65, of iron and steel 83, of auto tires 70 percent. Yet with these great restrictions of industrial output there was relatively little reduction in industrial prices—farm implements dropped only 6 percent in price, motor vehicles 16, cement 18, iron and steel 20, and tires 33 percent. The search for maximum profits was tending to develop a "scarcity economics", in which perennially the output of industrial production was reduced unduly, while prices remained so high that many consumers had to stay out of the market.

By the spring of 1933 the whole relation between agriculture and industry was thoroughly out of adjustment. Agricultural production was practically as high as ever while industrial production was at an extremely low level; for prices the situation was reversed—agricultural prices were away down, yet industrial prices had dropped relatively little. The basic recovery problem was to raise industrial production without raising those industrial prices which had not fallen, and at the same time to raise agricultural prices without reducing production beyond the need to compensate for the decline in the foreign market and eliminate surpluses.

Since May 1933 agriculture has had the help of the Government in controlling production for the purpose of raising prices. The Agricultural Adjustment Act states that the aim of production control is to restore agricultural prices to their fair relationship with other prices and to continue such adjustments as will maintain that balance. During the past year drought and agricultural adjustment together have largely taken care of the surpluses. This has brought prices to the farmer a long way back toward parity yet without as yet curtailing domestic consumption.

Limitations of Production Control

There is reason to doubt whether agricultural income as a whole can be restored completely to parity merely by production control.

While farm prices might be further raised by restricting domestic consumption along the lines of "scarcity economics", it is doubtful if this would appreciably raise farm income. One of the major elements in the restoration of agricultural parity is an increase in the purchasing power of the industrial population. A second major element is a reduction in the prices of industrial products that have advanced too far. When the industrial production and pay rolls are increased the industrial population is in a position to buy more food at parity prices. When industrial prices are lowered the farmer is in a position to buy more industrial goods with his money income. Thus, higher farm income and a higher standard of food consumption for the industrial population both turn on the employment and purchasing power of the industrial population. The farmer's great need now, as he continues his efforts to produce a balanced output, is that of getting full employment to the industrial population in order that consumers may be able to pay fair prices for higher consumption. Necessary as it was to meet the curtailed foreign markets and the surplus crisis of 1933, reduction in output is only a very partial and paradoxical answer in the long run to the crying need which is briefly expressed in the phrase, "balanced abundance."

The problem is to retain fair and reasonable profits without falling into the pit of "scarcity economics." As long as farmers had no power to control the total production or price of their products they were not seriously concerned with the problems of "scarcity economics." But now that farmers enjoy powers which are fairly comparable with those of city industries with respect to production and price control, it becomes necessary for all of us to spend more time thinking about the road to "balanced abundance" instead of "competition for profits induced by scarcity."

SOCIAL COSTS OF FARM ADJUSTMENT

Amid the rush of events connected with farm readjustment, it is difficult and yet important not to be overwhelmed by things immediate. We think about farm prices and farm incomes. We want to narrow the spread between actual and parity prices. And we judge the success or failure of crop control accordingly. But this is an inadequate test. It reckons only receipts and ignores expenses. There are costs to consider as well as returns. These costs, as nearly as possible, should be estimated in terms human as well as monetary, social as well as economic. Moreover, they should be compared with the probable costs, in similar terms, of any other available means of dealing with the farm problem. Readjusting production is necessary for lack of means to increase the demand. If we increase the purchasing power of the domestic market or of the foreign market or of both together, crop restrictions can be relaxed. Whichever course we finally adopt, it will involve costs, which will fall not wholly or even largely on any one group, but on the entire Nation. Both justice and expediency urge us to compare the alternatives.

Among the costs of readjusting production downward, which we should consider before figuring the costs of widening the market, there are intangible elements. Some of these may prove very important. Prominent among them is the social, as distinguished from

the administrative, cost of regulating agriculture. Some call it regimenting. It is well to call a spade a spade; but the term "regimentation" implies compulsion from above, whereas the farm adjustments in which we are engaged depend essentially upon the choice of the participating farmers. Strictly, the adjustment of farm production under Federal guidance involves not regimentation but merely social discipline. But this discipline may carry us far along new paths if we do not find an efficient substitute. It will involve unexpected and incalculable costs.

For example, it will involve a restriction of agricultural opportunity. Farmers may not produce as much of certain things as otherwise they would. Men not now in farming may not enter it unconditionally. The Bankhead Law penalizes the production of cotton above a certain quantity; and the Kerr-Smith Act applies a similar principle to tobacco. Processing taxes affect the conditions under which cotton, wheat, tobacco, and corn and hogs may be produced. Milk agreements help existing dairymen, at the cost of a restraint upon new competition. These are intended consequences. But persons kept out of agriculture may properly demand compensation. The regulation of agriculture for the benefit of insiders creates responsibilities toward outsiders. It involves intangible costs, not the least of which is a national obligation to protect all the groups affected.

No Escape Through Ruthless Competition

The alternative course is the competitive elimination of men and acres. This would mean endless distress, urban as well as rural, for men driven off the land would demand doles. Moreover, it would not obviate the need for social discipline. It would increase the need. Piling agricultural unemployment upon urban unemployment would create an immense new problem of poor relief, which would necessitate regimenting the recipients. It would flood the labor market, so that the Government would be forced to regulate it. We could not avoid economic regulation merely by not doing what we are now doing for agriculture. We might get a different kind of regulation, but that is all. Only by creating more employment, both in agriculture or in industry or in both, can we remove the need for economic controls. Returning agriculture to ruthless competition is not the way.

Meantime, pending the discovery of means adequately to revive demand, we must reckon the costs of regulation. Adjustments in one farm enterprise necessitate adjustments in others. Land can seldom be left idle. To withdraw land from one crop usually means putting it into another; if not into a competitive cash crop, then into something that will affect the balance of production eventually. Cornland planted to legumes will become more fertile. Land taken out of cotton or tobacco may produce food for the farm family, and thus affect the market for foodstuffs produced commercially. Agricultural regulation tends to become general, and to involve related industries such as flour milling, meat packing, and dairy processing. Withdrawing submarginal land from production creates additional responsibilities. Even partially to refuse men access to the land obligates the Nation to offer alternative opportunities.

On established farms, regulation involves an operating cost. It affects the size of fields, the use of machinery and labor, the intra-farm crop balance, and the relation of the farm overhead to the total income. Against the gain in prices, this item must certainly be reckoned. To reduce production greatly, without raising the unit costs, is extremely difficult. Extensive central planning interferes greatly with established farm practice, and obliges farmers to learn new ways. As Mark Twain said, there is no proficiency without apprenticeship, and no pay for apprenticeship. Regulating agriculture hampers its movements and checks enterprise. This is a debit item not to be ignored. Compared with such intangibles, the money costs of farm adjustment are secondary.

Economic Democracy

Viewing these restrictions and social costs, many honest thinkers believe our farm programs conflict with the essentials of democracy. If that is the case, they should be dropped.

But man's right to live transcends all other considerations. In the present state of the Nation, we must enlarge our idea of democracy, or risk losing what democracy we have. A purely political democracy would not survive a complete economic breakdown in the United States any more successfully than it has done elsewhere. The farm program looks toward an economic democracy thoroughly in harmony with our political democracy.

Farmers demonstrated conclusively that they wanted the Agricultural Adjustment Act. Through the Congress, the country concurred. The administration obtained the support of large majorities before putting any of the acreage adjustments or marketing agreements into effect. When farm opinion failed to unite on a proposed dairy program, the administration withdrew it.

Farmers themselves largely administer the adjustment programs through county control associations. These bodies help to make as well as to administer adjustment policy. Thoroughly democratic in form and spirit, the associations are effective instruments in economic self-government. They began by adjusting county and individual allotments. They were concerned at first about getting Government checks out to farmers as quickly as possible. This preoccupation soon gave place, however, to a deeper interest in the purposes of the whole undertaking. The committees now study crop supply and demand conditions, and price relationships. They bring general economic information to bear on local farm problems. They are helping the administration in taking a referendum on new corn-hog adjustment plans.

These local associations cannot finally formulate and administer national programs. That duty logically belongs, after all groups have been consulted, to the adjustment administration. But without the help of the county associations, the program could not be made effective. In thus decentralizing administrative work, and at the same time creating new channels through which farmer opinion may find expression, the Agricultural Adjustment Act promotes true democracy.

As is well known, participation in any acreage-adjustment program was originally voluntary. Later, under special legislation relating to cotton and tobacco, features penalizing noncooperation were introduced. Farmers themselves demanded this change. The Agricultural Adjustment Administration preferred to keep all programs essentially voluntary. It is unnecessary to coerce small minorities, and difficult to coerce large ones.

There is a worse danger to democracy than the extension of democratic principles to farming. Failure to solve economic problems is a worse danger. Such failure leads to class strife, and class strife to civil war. In civil war, whatever the outcome, democratic government disappears, at any rate for a long time. Recent history shows that at a certain point of misery and destitution nations cease to think about liberty, and think only about bread. Then they are ripe for dictatorship. In the United States we have an opportunity to retain our liberty and to strengthen our democratic institutions, while at the same time improving our material circumstances. We can do this by enlarging our concept of democracy and giving it scope in economics as well as in politics.

The exact methods of achieving economic democracy are by no means settled. How far the principle of majority rule applies legitimately to the control of farm production is not yet established, either through experience or discussion. But we cannot rule it out in advance as being inconsistent with democracy. We should certainly give the benefit of any doubt to the voluntary principle, while not regarding that principle as absolute. And we should encourage discussions, far and wide. We should also consider every alternative to the present adjustment programs.

FOREIGN TRADE IS ONE ALTERNATIVE

One alternative is the recovery of foreign trade. What will an effort to accomplish that entail? American agriculture was developed for trade with the world. Only in international trade can it freely move. Foreign buying of American farm products, however, requires foreign buying power in the American market. Such buying power existed before the war because foreign countries, principally in Europe, had invested heavily in American securities. During and after the war it existed because we lent money to Europe. Neither of these means of restoring our farm exports is likely to be quickly reestablished. There is another means. We may offer foreign countries, particularly European countries, a market in the United States for certain products, in exchange for a market for American wheat, cotton, tobacco, hog products, and fruits. We may lower our tariff wall, in return for a better market abroad; opening the door to foreign goods may displace certain domestic articles. That is the first cost to be considered. Against it must be figured the probable value of the compensating benefit.

What it will cost American industry to share the domestic market with foreigners depends partly on the nature of the goods imported, and partly on the amount of domestic purchasing power available. Selected goods could be imported liberally into a prosperous America, without hurting the American manufacturer. That we know from

what happened before the depression. In the calendar year 1929, during the greater part of which business was active in the United States, we imported merchandise to the value of \$4,399,000,000. Exports exceeded this figure by \$842,000,000. For the great bulk of the exports we took payment in imports, and no one complained. Because we did so American industry had more business than it could have had otherwise. In the ensuing depression imports and exports declined together. Thus in 1932 the merchandise imports totaled only \$1,323,000,000; but the exports were down also—to \$1,612,000,000. Buying less abroad did not give us proportionately more business at home. Conversely, an increase in imports now would not cut down but on the contrary would increase our total business. The exports would increase with the imports.

But the foreign-trade program would involve the risk of producing results other than those expected. We cannot know in advance the probable effect on prices and employment in industry. Nor can we foretell precisely the compensating benefit to agriculture. Asking industry and labor to make sacrifices for agriculture demands some assurance that the farmer will benefit. The purchasing power which foreigners would obtain in the United States market were they permitted to sell more goods here might be left on deposit, or invested in American securities, or devoted largely to the purchase of nonagricultural goods. That would leave unchanged the need to regulate agriculture. Formerly, when Europe had the means to do so, it bought farm goods heavily in the United States. Will it do so again?

Changing Relationship of the Hemispheres

This question does not admit of a dogmatic answer. The relationship between the Old and the New World has changed greatly. In the nineteenth century, when the United States was Europe's bread basket, this country took European goods readily in exchange for its cereals, meats, and fibers. It needed what Europe could supply. The need is smaller now. Other agricultural surplus countries, notably Canada, Argentina, Australia, and India, have more need of Europe's industrial goods. Against the competition of these countries, backed by their willingness to buy where they can sell, the United States must struggle. We cannot fully overcome this handicap merely by lowering our tariffs. Spontaneous reciprocity has advantages over the contrived variety. The cold fact is that while we need Europe greatly as a market, we do not need it greatly as a source of supplies. This is a hurdle to be leaped and not evaded.

Another difficulty is Europe's battle for self-sufficiency. Great Britain is relying more on Empire sources of foods and is encouraging Empire-grown cotton. France is practically self-sufficient in foods; Germany is nearing self-sufficiency. Last year Germany produced a slight excess of carbohydrates over its domestic requirements and about all the proteins it required. In fats, however, it remained heavily dependent on imports. Italy has forged ahead in food production but still depends upon imports for 13 to 18 percent of its food supply, measured in calories. The great Italian deficit is wheat. Even countries like the Netherlands and Belgium,

which cannot become self-sufficient in foods, buy abroad less than they would if they could export factory goods freely. But Europe is getting used to this increased self-sufficiency and has vested interests therein. Enterprises fostered by it cling to life. They have powerful defenders.

Fortunately, a change would benefit both hemispheres; for on both sides of the Atlantic the principle involved is the same. Each continent tries to live at home because it is difficult to sell abroad. In Europe the shoe pinches mainly industry; in the United States it pinches mainly agriculture. Shifting the pressure partly from one foot to the other in both hemispheres, simultaneously but in opposite directions, should ease the total strain. More international trade would create new purchasing power and would promote efficiency. Wresting trade from its natural channels, as we now do, adds to the operating costs of every farm and every factory. It violates the principle of comparative advantage. For every interest which the system nourishes, another interest, perhaps a more efficient one, dies. Europe has suffered more havoc of this kind than the United States, and has as much interest in discarding the strait-jacket.

Doubtful Value of So-Called "Self-sufficiency"

Europe's motives for working toward self-sufficiency are the fear of war and the necessity to correct an unfavorable balance of trade. Probably the economic motive is the stronger. National defense requires many things besides foods; many things which Europe must import, such as oil, rubber, cotton, and various minerals. In these articles Europe can never be self-sufficient. They can be stored; but first they must be purchased, and self-containment makes their purchase difficult. Increased self-sufficiency in foods does not really strengthen Europe's defenses, because it involves a reduced power to get other military necessities. But even in food, with the most prodigious efforts, Europe cannot become nearly self-sufficient. It still has to import something like 500,000,000 bushels of wheat annually. The greatest possible progress in self-sufficiency cannot free Europe from the need of imports, or allow it to ignore a blockade. Group interests that profit from the movement toward self-sufficiency stress the insurance feature for more than it is worth. They want to offset the economic drawbacks, which are tremendous. Europe's struggle for self-containment is costly, painful, and relatively inefficient. It subjects the urban population to a fearful strain. Limiting the importation of foods makes the food supply less abundant, less varied, less nourishing, and less cheap. It forces Europe to depend increasingly on cereals in order to get more calories from the soil and to pay more for a poorer living.

That is only half the story. By refusing to buy foodstuffs abroad, Europe loses its market for factory goods abroad. Thus for a thoroughly illusory self-containment the people pay in a reduced standard of living and in reduced employment. A majority would welcome a chance to exchange industrial goods for foodstuffs. This would involve some agricultural readjustments in Europe, just as it would involve certain industrial readjustments in the United States. But these would not be excessive. By importing cereals,

including feed grains, Europe could raise more meat and dairy products, and maintain larger rural populations. In the United States, on the other hand, the resulting improvement in farm buying power would strengthen the manufacturer's domestic market. There would be more business all around.

Restored Trade Would Be Mutually Beneficial

Europe needs the farm goods we have to sell, and foregoes them only from necessity. The advantage to the American farmer of enabling Europe to buy here once more would be enormous. American agriculture depends far more on foreign trade than does American industry. From 1921 to 1930 this country exported more than 13 percent of its farm production, and the trade constituted about a third of its total exports. Moreover, this third represented only primary agricultural products such as wheat and flour and cotton. It did not include many agricultural products elaborately manufactured and exported as manufactured goods. Since 1929 our farm export trade has declined in value nearly 60 percent. Restoring it substantially, through some increase in industrial imports, would give agriculture new life.

There would be no countervailing penalties upon industry. Broadly agricultural trade can increase only through an increase in the number of consumers. This is a consequence of the often-mentioned limitations of the stomach. Hence the only feasible alternative to the recovery of the agricultural export trade is the contraction of agriculture. No similar contraction of industry would result from an increase in industrial imports. For many industrial products the potential demand is boundless. Upon agricultural consumption the final limitation is physiological. Upon industrial consumption the final limitation is simply purchasing power. Whatever increases purchasing power increases the manufacturer's market. Hence the admission of foreign goods into the American market, since it would be accompanied by an increase in the purchasing power of the farmers, would handicap industry far less than the alternative policy of enforced farm contraction would handicap agriculture. Ultimately, indeed, the revival of normal international trade would permit great industrial expansion, besides removing much of the so-called "regimentation." Industry as a whole has as much to gain from this program as agriculture.

The long-continued decline in the value of our agricultural exports was checked in the marketing year 1933-34, in which domestic exports of agricultural products, exclusive of forest products, were valued at \$794,000,000, compared with \$590,000,000 in 1932-33, \$752,000,000 in 1931-32, and an average of \$1,792,000,000 during the 5 years 1925-26 to 1929-30. This gain in the value of exports resulted from the devaluation of the dollar and from the influence of reduced production on prices. The volume of exports, on the other hand, continued to decline. On the basis of 100 representing the average exports of agricultural products in the 5 years immediately preceding the war, the export volume in 1933-34 stood at 83, compared with 85 in 1932-33 and 98 in 1931-32.

RECIPROCAL TRADE AGREEMENTS

The Federal Government's program of reciprocal trade agreements looks toward the expansion of our foreign market for both agricultural and industrial products. Its success will depend on the extent to which we and the countries with which we seek to negotiate are willing to make reciprocal concessions. Foreign countries must give us substantial opportunities to sell them products, agricultural and industrial, which we can supply on a competitive basis. We must offer tariff reductions which will actually permit foreign countries to sell more of their products to us. Nothing can be achieved by making only such arrangements as will involve no sacrifice on either side.

It will be most difficult to get concessions on commodities which the importing countries produce in large volume. In such cases the foreign country, in making a real concession, must expect to contract its own production. It will naturally demand important compensating advantages. Of all agricultural products, it will probably be most difficult to obtain concessions on wheat. Even in the case of wheat, however, there is reason to hope that certain countries that have been striving for self-sufficiency and, in fact, in the last 2 or 3 years have actually achieved it, may conclude that such a course is uneconomical and likely to be disastrous eventually.

Foreign trade restrictions in hog products have fostered some increases in hog production in our foreign markets. Also, however, they have reduced consumption by raising prices. It should be easier to get concessions on hog products than on commodities the production of which has been expanded more.

Opportunities With Fruit and Tobacco

The best opportunities for trade bargaining concern fruit and tobacco. Trade barriers in importing countries have not caused any great increase in the production of fruit either in the importing countries themselves or in countries whose exports are not affected. In many cases our fruit exports have been subjected to restrictions, not in order to protect producers of the same products, but because they are considered luxuries. They are either taxed heavily for revenue, even though in some cases a lower tax would yield a larger return, or are largely excluded from some countries that desperately need to balance their international payments and seek to do so through restrictions on imports.

Tobacco has always been heavily taxed, but the taxes in many cases have risen to a point at which they reduce consumption. In a few countries, in Italy for example, domestic production has been stimulated, and it will be difficult to regain the market we have lost. In other countries tobacco production is less important, and lower import taxes might well result in increased imports from the United States.

Our cotton exports cannot gain directly from tariff bargaining. Most of the large foreign cotton-manufacturing countries do not produce cotton within their borders and only to a limited extent in their colonies. They are glad to get supplies at the lowest possible

cost. Only one country, Germany, has restricted imports of American cotton. Germany did so not for the protection of her domestic interests; on the contrary, German textile manufacturers suffered. The reason was entirely Germany's inability to pay for the necessary imports. Indirectly, however, cotton would benefit greatly from a revival of international trade.

Agreement Concluded With Cuba

Progress is being made in the organization of the tariff-bargaining work. Interdepartmental committees have been established on which this Department is represented. The State Department has announced an intention to negotiate trade agreements with many countries in Latin America and western Europe. Only one agreement has been concluded so far under the new tariff-bargaining law. This was signed with Cuba on August 24, 1934. In one fundamental respect it differs from the arrangements that may be concluded with other countries. In the Cuban agreement, the United States and Cuba grant to each other exclusive preferences on import duties which are not extended to other foreign countries. In general, under the terms of the tariff-bargaining law, the policy will be pursued of extending generally to all countries the concessions made on import duties by the United States. This is not true in the case of Cuba, to which we give preferences ranging from 20 to 50 percent, and Cuba extends to us preferences from 20 to 60 percent from the general duties applicable to other countries.

Concessions of Real Value to United States

The agreement with Cuba secures concessions that will be of real value to American agriculture. Lard is our most important agricultural export to Cuba. Only the United Kingdom and Germany have in the past surpassed Cuba in importance as a market for American lard. Our exports of this product to Cuba declined from 80 million pounds in 1929 to 11 million pounds in 1933. The principal factor contributing to this decline was the increase in the Cuban duty on lard from the equivalent of \$1.45 to \$9.60 per hundred pounds. In addition Cuba imposed a consumption tax amounting to \$1 per hundred pounds on lard. The total charge was practically prohibitive. By the terms of the agreement with Cuba, however, the Cuban duty on lard has been reduced to \$2.27 per hundred pounds; it will be reduced to \$1.86 on September 3, 1935, and to \$1.45 per hundred pounds on September 3, 1936. Cuba also agreed to eliminate the consumption tax by the last-named date. Similarly, favorable concessions were made on the duty on vegetable oils, notably cottonseed oil, which is an important item in our exports to Cuba. Cuba agreed to reduce the refined cottonseed oil duty from \$6.07 to \$1.36 per hundred pounds. Other agricultural products upon which substantial duty reductions or increased preferences were granted by Cuba were wheat flour, pork, potatoes, rice, and canned fruits and vegetables. Cuba also made substantial reductions in a long list of manufactured articles. These reductions, to the extent that they result in increased exports to Cuba of manufactured goods

and increased employment in our manufacturing industries, will redound to the benefit of agriculture.

In return for these concessions on the part of Cuba, the United States agreed to a reduction in the import duty on sugar, a reduction in the duty on tobacco and rum, and seasonal reductions in duties on certain fruits and vegetables. In the case of sugar and tobacco the reductions in the United States duties applicable to Cuba are accompanied by import quotas which limit the quantity that Cuba can place in this market. The quota on sugar was provided for by legislation passed by the last session of Congress. The quota on tobacco is provided for specifically in the agreement.

In providing for these quotas an important principle affecting the agricultural adjustment program has been established, namely, that with respect to products the production of which is being restricted or curtailed in the United States, there should be a corresponding restriction or curtailment in the importation of like products from foreign countries. This is a matter of logic. We cannot be in the position of reducing our own production in order to dispose of unwieldy surpluses and to obtain a fair return for our farmers and at the same time permit foreign countries to increase their exports to this market and take up the slack arising out of reduced domestic production. With respect to both sugar and tobacco, the agreement provides that if the adjustment program of the United States is abandoned, or substantially abandoned, the import duties will revert to those in effect at the time of the signing of the agreement.

The reductions in duty that Cuba has made, combined with an improvement in their purchasing power resulting from more favorable returns on their principal products, should permit the United States to regain a substantial part, if not all, of its lost market in Cuba.

THE DROUGHT

The drought of 1934 was the worst ever recorded in this country. It extended over 75 percent of the area of the country and severely affected 27 States. It cut down the yields of food grains and of cotton, reduced tremendously the production of feed, forage, and pasture, and necessitated a heavy reduction in livestock numbers. Food supplies for the Nation remained sufficient. There were on hand large stocks of bread grains and of several other food products, the production of canning crops was above normal, fruits and vegetables were fairly abundant outside the drought area, and the supply of meat, dairy, and poultry products was adequate for the rest of the calendar year. Local supplies of certain food products, however, were short in many areas. Reflecting the shortage of feed grains and roughage, there will be a sharp reduction in market supplies of meat and other livestock products in 1935, even if the growing season should be normal. In the areas hardest hit farmers suffered a decline in their income. For the country as a whole, however, the drought affected farm income but little. Higher prices tended to offset the reduction in marketings, and farm income, including benefit payments, for the entire country showed a substantial increase over the previous year.

Beginning in the early spring, the drought first became serious in the Northwest. From eastern Montana, the Dakotas, and Minnesota it spread to the Southeast, to the South, and to the Southwest. By the end of May it had become the most extensive drought on record in this country. It was severe in part of the Ohio Valley and the central and upper Mississippi Valley, throughout the central and northern Plains, over most of the Rocky Mountain sections, and in the Great Basin of the West.

No Indications of Permanent Change

There are no indications, however, that the drought constituted a permanent change to desertlike conditions in the Midwestern States. The Weather Bureau's records suggest that extreme drought in particular regions may be expected to occur at intervals of 30 to 40 years. Rain or snowfall tend to run in alternating periods of above and below normal. Each period covers a long time, and the periods are not uniform in length. The trends show up clearly, however, when we study the records graphically, and draw curves to smooth out yearly variations. In the long run the precipitation records vary in a wavelike progression. The difference in the rainfall in the periods of comparatively heavy precipitation, as compared with that of the periods of lighter rainfall, is marked. Moreover, the trends are rather uniform from maximum to minimum and vice versa. For the central Mountain States the records show a well-marked tendency to decreasing rainfall during the last quarter of a century. On the other hand, in much of the South, especially the Southeast, until recently the tendency was toward heavier rains.

In the central Mountain area the last maximum appears for the 10 years up to about 1908, or about 25 years ago. Since then a 10-year moving average shows a rather regular decrease. Thus the average precipitation in Minnesota for the decade ended with 1933 was only a little more than 23 inches, as compared with an average of 29.5 inches for the 10 years ended with 1908. The later decade had nearly 30 percent less rainfall than the earlier one. In a region where the normal precipitation is rather small such a decline is obviously very important. Centering in Minnesota, this decline covered the northern Plains to the west, especially the Dakotas, and extended to the western part of the Lake region on the east. About midway between the long-interval rainfall depressions appear successive years of comparatively abundant rains. There is nothing to indicate that history will not repeat itself in this respect. In another temporary period, not now predictable, much heavier rains undoubtedly will prevail.

Drought in the central valley began early last year. It did not immediately cause any general falling off in production, though we had a short wheat crop and a short hay crop for the country as a whole. But when the 1934 drought developed its results were far worse than they would have been had the season begun with normal moisture in the ground. Areas depending on irrigation water and all crops that need considerable subsurface moisture had a tremendous initial handicap. Snowfall was light in the western mountains during the winter of 1933-34. Streams dried up that had never dried

up before, and lakes fell to record low levels. Supplies of irrigation water failed and even supplies of water for livestock to drink failed in many regions.

Fairly good June rains in the Dakotas and Montana came too late to save the crops. Spring wheat, other small grains, and hay were already ruined. The June rains did help the livestock situation and improve the range. Meantime in other areas the drought became worse. It struck the western part of the main Corn Belt a fearful blow just when the corn could stand it least. High temperatures, hot winds, and dryness hit the crop as it was beginning to tassle. Fairly good rains late in July and in August improved matters in the eastern part of the Corn Belt, in the Potomac River watershed, and in some dry areas east of the Mississippi. Nevertheless, corn prospects declined greatly. In an area including the major parts of Nebraska, Kansas, Missouri, and South Dakota, and parts of southern Iowa and west-central Illinois, corn for grain was practically a total failure. In Texas, Oklahoma, and Arkansas only the early planted corn produced grain.

The first half of August brought very helpful showers to most of the Ohio Valley area, and the last half of the month had much cooler weather, with substantial to heavy rains, in much of the Southwest, especially Oklahoma and Missouri. Moreover, during September wide-spread, generous rains effectively relieved droughty conditions, at least temporarily, over a large midwestern and southwestern area extending from southern Minnesota and Nebraska over the western Winter Wheat Belt. The rains were especially timely in conditioning the soil for seeding winter wheat over the most important sections of the belt.

Reduction of the Surpluses

Outstanding among the results of the drought was a great change in the farm-surplus situation. Normal wheat consumption in the United States to the end of the 1934-35 year, assuming neither imports nor exports, will reduce the wheat carry-over to about 156,000,000 bushels, as compared with an average of about 339,000,000 bushels in the preceding 5 years. The 10-year average previous to 1929 was 110,000,000 bushels. The cotton carry-over will be close to normal by the end of the 1934 season, though the drought was less responsible for reducing the supply of cotton than the acreage adjustment.

Production of corn, oats, barley, and grain sorghums was only about 63,000,000 tons as compared with an average of 101,000,000 tons for the period 1928-32. This reduction in the feed supply entailed corresponding adjustments in livestock numbers. The number of hogs fed for the marketing year beginning October 1, 1934, may be less than 70 percent of the number fed for the preceding marketing year. By next spring cattle numbers will be sharply reduced, in the most rapid liquidation ever known.

Prices of many of the crops severely affected by the drought rose during the summer. Grain and hay prices advanced sharply. Cotton prices advanced when drought damage to that crop became apparent. Cattle prices did not respond immediately, because heavy

marketing from the drought areas occurred. Other classes of livestock, except hogs, either failed to advance or declined in prices through forced marketing. Hog prices improved significantly. Livestock products showed a quicker tendency to rise in price than livestock. Butter and egg prices strengthened notably. Ultimate effects of the drought on prices will be greatly different from the first effects. The prices of cattle, sheep, and poultry will undoubtedly advance after the forced marketing is over. The slower response of livestock prices to the drought will probably cause these prices to remain relatively high longer than other farm-commodity prices.

Drought Relief Action

The Government relieved farmers who had been made destitute. It bought starving cattle, shipped food, feed, and seed into the drought-stricken areas, assisted farmers in maintaining their foundation herds, and in digging or deepening wells, and provided employment. In various activities the Agricultural Adjustment Administration, the Federal Emergency Relief Administration, the Federal Farm Credit Administration, and other Federal agencies cooperated. Benefit payments for crop adjustments and funds available for the control of livestock diseases were important sources of relief. An important emergency step modified the planting restrictions on farms under A. A. A. contracts so as to encourage the production of forage.

The cattle buying resulted up to the middle of October in the purchase of about 7 million cattle in 20 States. For these cattle the Government paid \$92,000,000. Formerly in times of severe drought the markets quickly became glutted with thin cattle. Farmers had to sacrifice many of their best animals. This year they did not have to force their stock upon the commercial markets at a heavy loss. The Government paid a fair price. Farmers were able to dispose of their older and less profitable stock, as well as calves and young cattle, for which they had insufficient feed. Had there been no drought, a reduction of some 4 million in cattle numbers would have been desirable. Nineteen hundred and thirty-four was the peak of the cycle in cattle numbers, and the heavy supply depressed the price. A large proportion of the cattle that had to be removed owing to the drought was no loss to the cattle industry. But as the drought grew worse it became necessary to go beyond this point and to speed up cattle purchases to the limit set by processing facilities.

However, the purchase of cattle meant that as many more were saved from starvation. Feed which the purchased cattle would otherwise have eaten became available to tide 7 million other cattle over the winter.

Funds for the cattle buying came partly from an appropriation for a cattle-adjustment program under the Jones-Connally Act and partly from a special congressional appropriation of \$525,000,000. The Agricultural Adjustment Administration established a field headquarters at St. Paul, Minn., and obtained the cooperation of extension directors, agricultural college leaders, and county agricultural agents. Accredited veterinarians, or local committees appointed for

the purpose, appraised and purchased animals. Field agents of the Federal Surplus Relief Corporation took delivery of the animals and shipped them to be slaughtered.

For the cattle purchased the Government paid an average price for all ages of about \$13.50. The prices included a benefit payment to cattle producers free of all liens. The schedule was uniform for all States. Including the benefit payments, it ranged from \$12 to \$20 for cattle 2 years old and over, from \$5 to \$15 for yearlings, and from \$4 to \$8 for calves under 1 year. These prices were established as nearly as possible on the basis of what cattle would bring on the slaughter market, without any deduction for shipping and marketing costs. Thus the cattle-buying program brought the market to the farm. Six dollars of the price paid for 2-year-olds, \$5 of the yearling price, and \$3 for the price of calves constituted benefit payments. These benefit payments roughly equaled the shipping and marketing costs that farmers would have had to pay had they shipped their cattle to market in the usual manner. Farmers and their creditors alike generally found the arrangement fair and acceptable.

Purchase of Sheep and Goats

Most of the cattle purchased, except animals condemned as unfit for food, were delivered to the Federal Surplus Relief Corporation for slaughter and canning in commercial packing plants for later distribution to needy families. Some cattle were shipped to States where pasturage was available. Later, the Government launched a program contemplating the purchase of several million head of sheep and goats. It arranged to pay \$2 a head for ewes 1 year and over and \$1.40 a head for female Angora goats of the same age. Flocks came off the high mountain ranges 3 to 6 weeks early as a result of the drought. They moved into feeding grounds often entirely bare of vegetation. Supplies of hay and other feeds were scarce and dear. It was necessary, in order to avoid severe winter losses, to reduce the flocks from 30 to 60 percent. A Federal livestock feed agency was set up in Kansas City, to aid in the distribution of feed and forage. County committees surveyed feed needs in the drought areas and arranged with local dealers to order supplies.

Various other activities under the Agricultural Adjustment Act aided farmers in dealing with the drought. Of course, the drought had not been anticipated when the 1934 A. A. A. plans were being formulated. As it worked out in the end, however, more feed was available in 1934, in proportion to the livestock, than would have been available if production-control programs had not been in operation. These programs brought about an orderly adjustment in hog, cattle, and sheep numbers, and a net increase in forage-, pasture-, and hay-crop plantings. As a result, agriculture came through the season with about 6 percent more grain per grain-consuming animal, and with about 17 percent more hay per hay-and-pasture-consuming animal than would otherwise have been available.

Without the programs, the production of feed grains would have been somewhat larger. But livestock numbers especially of hogs, would have been much larger. Without the adjustment programs, the volume of grain available per grain-consuming animal unit would

have been about 1,040 pounds, as compared with 1,100 pounds that will actually be available or an increase of about 6 percent due to the A. A. A. programs. Encouragement given by the programs to hay production will make the current hay supply about 13 percent greater than it otherwise would have been. In the case of hogs particularly, the adjustment programs show a substantial benefit. Hog production would have been much larger had the programs not been put into effect, and the enforced liquidation of surplus stock at very low prices would have involved severe loss. The hog programs averted disordered and expensive last-minute adjustments. Then after the drought appeared, if it had not been for the cattle- and sheep-buying programs, cattle and sheep prices probably would have fallen below the point at which they could offset marketing costs.

AN EVER-NORMAL GRANARY

One effect of the drought is to emphasize the importance of maintaining adequate farm reserves, particularly in regions subject to extreme hazards. In the pioneer epoch, farmers stored feed and hay against lean years as a matter of course. With the development of communications and of transportation, and with the resulting evolution of a more specialized and more commercialized agriculture, the practice declined. Farmers came to doubt that it paid. In the dry-land regions the newer system had obvious risks. These risks could be carried during the years of moderately heavy rainfall, the more easily because fairly good prices prevailed. The chance to lay by a money reserve weakened the motive to establish a commodity reserve. But the situation now is different. Against the combination of weather hazards and low prices, farmers need the protection of an adequate reserve with safeguards against any possible depressing influence on prices. Here, in conjunction with the crop-adjustment program, is an obvious responsibility of the Agricultural Adjustment Administration. Means should be developed to conjoin the adjustment of plantings with protection equally against crop failure and against the tendency of large stocks to depress prices.

Significance of Curtailed Foreign Outlet

Since 1933 the demand from abroad for American farm products has undergone no material change. Our exports of grains and livestock products have almost disappeared. We continue to export cotton and tobacco and fruits in large quantities, but the foreign market for these commodities is not what it was. In the case of all food products except fruits, we have still to think in terms of a sharply curtailed foreign outlet. As far as we can see for the moment, our emergency program and the first phases of our long-time program must be shaped toward reduced production for export. This may be less permanently true of cotton than of grains and livestock products. For the present at any rate, however, the cotton situation also calls for production adjustment.

But reduced production for export raises certain new questions. Adjustments nearer to domestic requirements need to be coupled with protection against crop failure. Farm reserves must be larger

than the so-called normal "carry-overs" of predepression days. Formerly, when we produced heavily for export, carry-overs did not have to be large. It was simply necessary, in seasons of small production, to reduce the exports. In proportion as this automatic safeguard disappears, it becomes more important to maintain reserves from season to season. Such reserves tend to stabilize both production and prices. Our emergency experiments have revealed more clearly the requirements of controlled production. One requirement is a method of absorbing the shock to markets which occurs when seasonal conditions violently disrupt the intended adjustment.

When production varies greatly, either through weather conditions or the action of farmers, prices fluctuate correspondingly, but not usually in a manner permitting farmers to break even. They lose more on the declines than they get back on the advances. This is largely because speculators intervene between the producers and the consumers. Speculation depresses prices excessively to farmers in seasons of surplus production, and keeps from them the full benefit of rising prices in seasons of low production. Too much of the consumers' dollar goes to nonproducers. Hence producers and consumers have a common interest in the control of both production and marketing.

We now have a fairly satisfactory mechanism for controlling acreage, and in the case of some crops for the control of marketing. We have had some experience with storage for the double purpose of insuring the farmer a satisfactory current price and of maintaining reserves.

The Cotton and Corn Loans

In 1933 the Federal Government established the Commodity Credit Corporation. Up to the present it has lent money only on cotton and corn, and a small amount on naval stores, but the loaning facilities could be expanded to cover other storable commodities. The corporation obtains its funds from the Reconstruction Finance Corporation, which has made commitments of \$500,000,000 to it for use in connection with the loan programs.

During the 1933-34 season, the basis of the cotton loans was 10 cents per pound. Borrowers agreed to participate in the 1934 cotton-adjustment program. The Commodity Credit Corporation loaned direct to cotton borrowers approximately \$60,000,000, and the banks and other lending agencies of the interior, who were authorized to participate in the loan program, loaned an additional amount of approximately \$60,000,000. The Commodity Credit Corporation agreed to buy in such paper as was offered it by the interior banks and lending agencies prior to July 1, 1934. The purchase of this paper brought the total loans made by the corporation up to a total of approximately \$102,000,000. It is estimated that more than 420,000 cotton farmers have been benefited under this program. Approximately 64 percent of the total amount loaned was liquidated by September 12. In 1934, the administration continued its cotton-loan program, with the loan basis increased to 12 cents per pound.

On corn during 1933-34 the Administration made loans to producers at 45 cents a bushel. About 270,000,000 bushels were sealed in farm cribs. The loan value was above the current market price of

corn at the beginning of the season. Subsequently prospects of reduced corn production raised the market price, and farmers were therefore able to liquidate their loans at a substantial profit. Scheduled originally to end on August 1, 1934, the Government extended the corn-loan program to September 1. Up to September 15, 160,000,000 bushels had been released from storage.

As in the case of cotton, the Government will continue the corn-loan policy to cover the 1934 crop. It has increased the loan value to 55 cents a bushel. This price, while below the market price in September, and below the price that is expected to prevail for the marketing season, gives farmers a means of keeping a supply of corn within their control. In a year of short supplies this is obviously an important consideration. On both cotton and corn the loaning policy has proved to be economically sound and helpful to farmers. It has furnished experience that will be valuable in creating the ever-normal granary.

The corn loans, particularly, demonstrated the advantage of farm storage coupled with production adjustments. They removed from the market in 1933 the depressing effect of stocks present above current needs, and established a reserve, which the 1934 drought made invaluable. Under ordinary conditions the excess supply would have moved into commercial channels, beyond the control of the farmers. After the crop failure of 1934 they would have had to buy back the reserve at greatly enhanced prices. But instead of having parted with the surplus, they had simply borrowed against it. It remained available to them at no increase in cost, except the interest on the loans, for maintaining their livestock under drought conditions. Farmers were in a much better position to preserve their breeding stock than they would have been had their cribs been depleted in the usual way.

Necessary Size of Reserves

Drought years do not usually come in succession and crop adjustments must rest on the expectation of normal growing conditions. Nevertheless, the two seasons of drought through which we have passed raise urgently the question, "What should be an adequate reserve?" We used to consider 120,000,000 bushels a sufficient carry-over of wheat. Perhaps we ought now to plan for a normal carry-over of 200,000,000 bushels, and for much increased carry-overs of some other crops. Means must be developed, however, to prevent the additional stocks from depressing prices. Storage must be linked with production control.

Ordinarily heavy carry-overs reduce the price to producers. Agriculture had painful experience of this fact as a result of the stabilization operations of the Federal Farm Board. Storage by itself, even by the Government, is ineffective. Withholding supplies does not support prices for long if production increases unduly. This country's efforts under the Farm Board to stabilize wheat and cotton prices simply by storing surpluses demonstrated that not even a powerful Government, with ample funds, can bolster prices against overproduction.

With borrowers obligated to cooperate in crop adjustments, the Commodity Credit Corporation could make loans on various storable

crops, just as it has done on cotton and corn. Lending at a higher percentage of the current value than is usual in private or Government loans would insure wide-spread participation by farmers. In years of large production, surpluses would be stored on terms fair to the farmers, and yet not involving risk to the Government. The contracts with borrowers for the control of production the following season should prevent the price of the goods from falling below the loan figure. Hence the loans would be reasonably safe.

This system would have many advantages. It would protect consumers against possible shortages and tend to stabilize production and therefore prices. There is, of course, always a chance of surplus crops 2 or more years running. But even in that case the ever-normal granary would absorb the market shock. It would simply be necessary, following two or more heavy crops, to reduce the acreage sharply. Moreover, the ever-normal granary would furnish a means of regulating the production of livestock. Growers could draw on the stored feed to stabilize livestock numbers. We may have here the beginning of means to control the livestock-production cycles.

Coordinating storage with crop adjustment would have another advantage. Stored commodities could be used in lieu of cash benefit payments. Part of the stored surpluses would probably become the Government's property. This part could be released to farmers as compensation for crop adjustments. Farmers would thus have the possibility of a speculative profit, the amount of which would depend largely on their success in controlling production. Giving the farmer a certain quantity of wheat, instead of a certain amount of cash as benefit payment for crop control, would bring home vividly to the producer's mind the relation between supply and price. It would create another motive for the crop adjustment.

Plan Would Not Harm Business

As a part of the program the Government would need to guarantee private traders against the apprehension of sudden disruptive releases of stored goods. Commodities would be released only with due regard to prevailing market conditions. Full information as to the storage program would be made public. In the 18 months during which the Agricultural Adjustment Administration has functioned it has played square with business. It will continue to play square. It will not spring any surprises on the market. It will coordinate the storage and adjustment operations so as to promote the ultimate objective of the Agricultural Adjustment Act—the restoration of farm commodity prices to the pre-war parity. Flexibility is essential in adjustment to a changing situation. But keeping a program flexible need not mean letting it become sudden, spasmodic, or harmful to business.

FARM RESULTS OF RECOVERY POLICIES

Following the passage of the Agricultural Adjustment Act, the position of agriculture improved greatly. Farm-commodity prices in September 1934 averaged 102 percent of the pre-war level as compared with a low point of 55 percent reached in March 1933. Gains in farm-commodity prices were partly offset by increases in the prices

of commodities bought by farmers. From 1932 to 1933 the index of prices paid by farmers advanced 2 percent. From March 1933 to September 1934 it advanced 26 percent. However, the exchange value of farm products in September 1934 was 81 percent of the pre-war level as compared with only 55 in March 1933.

In 1932 the average farmer, after paying interest, taxes, and the expenses of production, had nothing left as a return for his capital and management. In 1933, for the first time since 1929, he had left a small net balance after writing down his capital structure. Income from marketings in 1933, with benefit and rental payments added, exceeded that of 1932 by 16 percent, and prospects are for an additional gain of 19 percent in 1934.

The total cash income of farmers from the sale of farm products for the calendar year 1934, including rental and benefit payments and income from the sale of cattle, sheep, and goats to the Agricultural Adjustment Administration, is estimated at approximately \$6,000,000,000. This estimate is based upon an analysis of farm production in 1934, probable prices and marketings of farm products during the last 5 months of the year, and cash income during the first 7 months of the year as previously estimated. The estimated cash income for 1934 is 19 percent larger than in 1933 and 39 percent over 1932.

Estimates of cash income from farm marketings on a calendar year basis from 1924 to 1934, including rental and benefit payments in 1933 and 1934, are as follows:

1924-----	\$9,785,000,000	1930-----	\$8,451,000,000
1925-----	10,324,000,000	1931-----	5,899,000,000
1926-----	9,993,000,000	1932-----	4,328,000,000
1927-----	10,016,000,000	1933-----	5,051,000,000
1928-----	10,289,000,000	1934-----	6,000,000,000
1929-----	10,479,000,000		

Farm Realty Values

In the year ended March 1, 1934, the average value of farm real estate for the United States as a whole showed an increase. It was the first year since 1920 to record a gain. This was good evidence of farm improvement; for farm-land values depend ultimately on farm earnings.

From the low point of 73 percent of the pre-war level, to which farm-real-estate values declined in the preceding year, the average value for the country rose in the year ended March 1, 1934, to 76 percent of the pre-war level. The improvement was not distributed equally in all regions. Roughly, the regional changes reflected differences in farm earnings. The greatest relative increases occurred in the South Atlantic and South Central States. Improvement in farm commodity prices and in farm incomes was a leading cause of the upturn in farm-real-estate values. The fact that the gross income from crops increased much more than the gross income from livestock and livestock products was an important reason for the uneven distribution of the gains in farm land values.

This all around improvement is the result of many factors, the separate influence of which cannot be measured. Undoubtedly, however, the recovery program launched by the National Government,

with its threefold effort to adjust the general price level through monetary action, to bring farm production more nearly into balance with the demand, and to refinance and otherwise to relieve farm debt is by far the most important.

Effect of Monetary Policies

Revaluing the dollar benefited agriculture because prices of the raw-material farm products responded promptly, while prices of many of the things that farmers buy increased more slowly. The Government suspended gold payments on foreign account on April 19, 1933. Other steps followed under title III of the Agricultural Adjustment Act, which gave the administration emergency monetary powers. Between April 15 and July 15, 1933, the farm price of cotton advanced 75 percent and the farm price of wheat 92 percent, but this rise was partly speculative and some reaction followed. A revival of textile manufacturing, and the expected crop adjustment, helped the price of cotton. In the case of wheat, the prospect of a short crop was a factor. In both cases, however, the new monetary policy was obviously an important influence, as may be inferred from the advances that took place simultaneously in nonagricultural raw materials. The effect of the devaluation on prices of farm products did not cease with the subsequent stabilization of the dollar at a new value. Farm commodities that had not responded immediately to devaluation responded slowly. As a result of devaluation, agriculture has gained in power to buy nonfarm goods and also in power to meet debts and taxes.

Results of Crop Controls

The first year's cotton program simply prevented an increase in the surplus. Farmers, however, saved the extra expense of carrying the full-planted acreage to harvest. They received an average farm price of 9.7 cents per pound for their crop, and rental and benefit payments besides. From the lint the growers received about \$633,000,000 as compared with \$424,000,000 realized in 1932. In addition they received \$163,000,000 in rental and benefit payments. Consequently the income of cotton farmers from lint in 1933 was about 88 percent more than in 1932. About half the increase may be properly attributed to the activities of the Agricultural Adjustment Administration. By the end of the 1934 season the world carry-over of American cotton will be close to normal, and higher prices for American cotton should prevail.

Activities of the Agricultural Adjustment Administration helped to increase the income of wheat growers. The cash income from wheat marketings in the 1933-34 season (exclusive of benefit payments) was about \$267,000,000 as compared with \$195,000,000 in 1932. Growers obtained this amount from the sale of only 368,000,000 bushels, whereas marketings the previous season totaled 524,000,000 bushels. Price gains more than sufficed to offset the reduction in the 1933 marketings. Benefit payments added \$98,600,000, so that the total cash income from wheat for the 1933 season amounted to \$366,000,000, an increase of \$171,000,000 over that of the previous year.

In the 1934-35 season farmers will market some old wheat carried over from the previous seasons, and also the new crop, at prices which may give them an income a little larger than they received for wheat during 1933-34. There will also be benefit payments.

In the case of corn and hogs the full benefit to farmers from the activities of the Agricultural Adjustment Administration has not yet been realized. Prior to the midsummer of 1934 prices of hogs and the income therefrom did not improve significantly. Nevertheless, distinct advantages from the adjustment programs may be recognized. By purchasing pigs and sows in the fall of 1933, and subsequently by making large purchases to provide meat for relief, the Government stabilized the market through the winter season. By placing a large quantity of corn under seal for loans, it helped to conserve the supply of corn, and at the same time to slow up livestock production. Hence the corn-hog program will realize its greatest benefits within the next 12 months. Already prices are reflecting the prospect of better adjusted supplies, and in addition to higher prices farmers will receive large benefit payments. Considering 1933 and 1934 together, hog producers should receive, with the benefit payments, some net gain in income. Still more important, the supply situation will be adjusted to a more profitable basis.

The tobacco program increased the growers' receipts from the 1933 crop by about \$50,000,000. In addition, growers received \$28,000,000 in rental and benefit payments. The total income of farmers from tobacco during the marketing year 1933-34 was approximately double that of 1932-33 and nearly equal to the average for the last 10 years. Tobacco farmers received an increased proportion of the consumer's tobacco dollar.

More than 90 percent of the tobacco growers of the United States and Puerto Rico are operating under production-adjustment contracts. The 1934 crop was approximately 25 percent smaller than that of 1933 and was as much below the average annual world consumption of American tobacco as last year's crop was above that level. For the first time in several years the returns appear to be remunerative to tobacco growers.

Farm Debt Relief

Great benefit to agriculture has also resulted from action taken under the Emergency Farm Mortgage Act of May 12, 1933, and the Farm Credit Act of June 16, 1933.

Formed by Executive order of March 27, 1933, the Farm Credit Administration merged a number of existing Federal credit agencies and created a central administration. This organization administers the provisions of the Emergency Farm Mortgage Act, and also of the Farm Credit Act, which provides new facilities for production and marketing credit and for cooperative credit. The Farm Credit Act, supplementing the Federal Farm Loan Act of 1916 and subsequent legislation, provides a complete credit service for agriculture which is designed for permanency.

In the prolonged depression, farm credit had virtually collapsed. Many credit institutions were bankrupt, and more than 40 percent of the banks in the country closed their doors between July 1928 and

July 1933. The restriction of credit was more pronounced in agricultural areas than elsewhere. Consequently the Farm Credit Administration reorganized the facilities of the Federal land bank system and began refinancing farm-mortgage debts.

Recognizing that depression values did not represent the true worth of farms, the Farm Credit Administration inaugurated the policy of appraising farms on the basis of normal values, and through its refinancing operations provided quick relief to farmers and overburdened lending institutions. Frozen credits were melted and business confidence in agricultural areas revived.

Farm-mortgage debts in the United States in 1932 constituted about \$8,500,000,000, out of a total farm-debt burden of probably \$12,000,000,000. Private institutions and individuals held a large part of the farm-mortgage debt, while commercial banks carried both farm-mortgage and short-term loans in large amounts. The total farm debt in 1932 amounted to nearly three times the total gross farm income of that year and was about equal to the gross farm income of 1929. Under the prevailing credit conditions, the farm debt threatened to ruin both debtors and creditors. The newly created credit facilities relieved both groups.

In the first 15 months under the Farm Credit Administration the Federal land banks made over 450,000 loans to farmers for more than \$1,150,000,000. About 90 percent of these loans refinanced existing indebtedness. By the summer of 1934 the Federal land banks and the land-bank commissioner were holding over \$2,100,000,000 in farm mortgages.

Claims Scaled Down

Creditors who were desirous of converting farm paper into cash have, in many instances, scaled down the amount of their claims in order to make it possible for heavily indebted farmers to refinance their loans through the Farm Credit Administration. Such scale-downs were necessary where the farmer's total debts exceeded 75 percent of the normal value of his property, since a land-bank commissioner's loan, together with prior liens, may not, under the law, exceed 75 percent of the normal value of the farm property offered as security for the loan. From June 1, 1933, through August 22, 1934, borrowers through the Farm Credit Administration obtained reductions in their indebtedness amounting to more than \$56 000,000. About 16 percent of the borrowers obtained scale-downs of their indebtedness in connection with the refinancing operation. Where such reductions occurred the amount scaled down constituted 26.3 percent of the prior indebtedness.

Furthermore, these borrowers benefited from interest reductions, because the rates charged by the Federal land banks and the land-bank commissioners are usually lower than those previously paid by the borrowers. In interest alone the saving to farmers on farm-mortgage indebtedness refinanced through the Farm Credit Administration is estimated at over \$16,500,000 a year, or nearly one-fourth of the interest formerly paid on the same indebtedness.

Under the Emergency Farm Mortgage Act all borrowers from the Federal land banks obtained a reduction in their interest charges.

On Federal land-bank loans in force in May 1933 the interest rate ranged from 5 to 6½ percent, and averaged 5.4. During the 5-year period ending July 12, 1938, the rate of interest on loans made through national farm-loan associations prior to May 12, 1935, is reduced to 4½ percent. The interest rate on loans obtained directly from the Federal land banks is temporarily reduced to 5 percent. In addition, the legislation authorized postponement of principal payments during the 5-year period ending July 12, 1938, and also provided that extensions of unpaid installments on loans might be granted to worthy borrowers during this period.

Local Credit Associations

During its first year the Farm Credit Administration also helped farmers build a system of 650 local production credit associations. These associations of farmer borrowers are now in operation and provide a permanent Nation-wide system of low-cost production and marketing credit. The associations make loans on crop and chattel security, and through them production money becomes available to farmers and stockmen at rates of interest which, for the country as a whole, are the lowest ever charged for this type of credit. The associations are now making loans to farmers and stockmen at 5 percent interest. Many private lending agencies charge 2 to 3 percent more.

Thus Federal action under the new administration has furnished three principal types of agricultural relief. (1) By devaluing the dollar it has caused the prices of certain farm commodities to rise more than the prices of the things that farmers buy, and increased their ability to meet debts and taxes. (2) Through production adjustments financed by processing taxes and through marketing agreements with production-control features, it has brought the supply of farm commodities more nearly into a profitable relationship with the demand. (3) Through credit relief it has lightened and refinanced farm debt. It would not be correct to ascribe the whole improvement in farm conditions during the last 2 years to Federal activities. Much must be credited to the country's natural recuperative power. Depressions tend to run their course and to generate corrective forces spontaneously. However, this is a slow and painful process. In important respects, moreover, the present depression differs essentially from preceding depressions. It is world-wide and marked by an unprecedented break-down in international trade in which there has been as yet no significant revival. American agriculture was developed largely for trade with the outside world. The farm recovery of the last 2 years owes little or nothing to recovery in the world market. It is the result mainly of domestic changes, in which the activities of the Federal Government have been the most important element.

MARKETING AGREEMENTS

Another approach to the problem of increasing the income of farmers is through the marketing agreements and licenses authorized by the Agricultural Adjustment Act. Experience with such agreements and licenses during the past year indicates that under proper circumstances they may benefit producers substantially.

Marketing agreements have proved to be particularly useful in the control of surpluses and in the regulation of shipments. Surpluses can seldom be effectively controlled by marketing agreements and licenses without the participation of 100 percent of the industry. A number of attempts have been made to deal with a surplus problem through the cooperative organization of growers and handlers, but it was seldom possible to obtain the support of the entire industry. In most instances from 15 to 20 percent of the producers refused to cooperate and were thus able to obtain substantial benefits under the program without sharing the costs.

In the season of 1933, for example, California's supply of Valencia oranges was so large that all of the larger marketing agencies and a number of individual shippers entered into a voluntary proration agreement. These agencies ship more than 90 percent of the Valencia crop. Despite the large percentage of the industry which was cooperating, it was found that the small minority outside the agreement shipped quantities considerably in excess of their proper proportion. In other words, this small minority profited by the sacrifices of the large majority. The experience under this voluntary agreement led the industry to develop a marketing agreement under the A. A. A. This agreement has been in operation since December 1933. Plans for national proration under a national citrus agreement are now going forward.

Officially approved marketing agreements have placed many programs on such a basis that all the groups concerned, cooperative and proprietary alike, must participate. Embodied in the terms of a blanket license, the essential features of the marketing agreement bind all the handlers or processors engaged in the industry. By this means the former noncooperators are kept from reaping more than their share of the benefits. Marketing agreements and licenses have thus made it possible for the growers of citrus fruits, walnuts, raisins, and other commodities to avoid the disastrous effects of unregulated supplies.

Supply Control Features

Marketing agreements usually involve more than the simple term "agreement" may imply. Producers, processors, and handlers of farm products sometimes believe that simple agreements as to prices will increase the income of producers. Simple price agreements may work occasionally, but usually only for one producing season. Generally, marketing agreements require provisions for affecting supplies, either by regulating the movement to market or by eliminating part of the supply from commercial channels. In a measure the supply-control features of the marketing agreements correspond to the production-control features of the adjustment programs developed for the major crops. However, the agreements usually provide only for the control of supplies already produced and not for the control of new production.

Marketing agreements have dealt effectively with perishable commodities produced at great distances from consumer centers. In such cases transportation and handling costs absorb much of the

terminal market price. In years of excessive supplies the wholesale price at consuming centers tends to fall below the handling and shipping costs. It is then possible for the producers and handlers, acting in cooperation, to control the movement of these products so as to avoid the demoralization of the markets. They can retain excessive supplies in the area of production and save handling and transportation costs, which would largely represent loss.

Many different methods of regulating market supplies have been developed in connection with marketing agreements. Agreements relating to fresh fruits and vegetables usually provide for a simple proration of shipments, sometimes coupled with a stricter control over the marketing of low-grade products. Methods must suit the particular industry. Frequently a careful regulation of shipments, so as to avoid alternate gluts and shortages, improves the net income of producers, without reducing total supplies to consumers. Farmers dislike to destroy or to refrain from marketing products which they have grown. Hence there is little danger that proration will restrict marketings excessively.

Supply-control features of some agreements divert a portion of the supply from the regular trade channels into byproducts. Such arrangements are now in effect for the walnut and raisin industries. The purchase of excess supplies for relief purposes, and their removal from commercial channels, have like effects.

Some agreements and licenses control prices paid to producers. To be effective in most cases such action must be coupled with some control over supplies marketed or over marketing and distributing practices. Wherever possible, the administration has avoided direct price fixing in connection with marketing agreements and licenses. Many of the early agreements, including those relating to peaches, olives, and milk, provided for fixed prices to producers and fixed resale prices. This involved the fixing of processing or distribution margins. Price fixing of this character necessitates either a satisfactory compromise as to the size of the margin or regulation of the spread in price between producer and consumer. Such regulation would require administrative machinery and procedure similar to that which the Interstate Commerce Commission has been developing for a generation. As a matter of fact, it is doubtful whether processing and distributing margins can be dealt with satisfactorily through marketing agreements. In most cases the A. A. A. will sponsor the direct control only of prices paid to producers, and not then unless price control goes along with some measure of supply control or regulation of market prices.

The Milk Licenses

In the case of milk licenses, which provide for minimum prices to producers, the classification of milk according to its use, the equalization of sales opportunities and of surplus burdens among producers, and other protective measures are all interwoven with prices, and with the problem of increasing the income of milk producers. In most cases the minimum-price provisions of the licenses have been of direct value to producers by affording reasonable price stability and by protecting producers against the past practice whereby

farmers bore the brunt of dealers' price wars. Under the licenses, prices may be so determined as to make for a reasonably compact milk shed without having any of the objectionable features of fixed territorial boundaries or certificates of necessity. For example, by requiring through a license that all distributors pay the same price for milk used for similar purposes, it is possible to remove the chief incentive which the distributor has to go out and develop new sources of supply when such supplies are not needed in the market. Furthermore, by requiring that all distributors participate in a pooling plan for a particular market it becomes impossible for a group of producers either to undersell the market or to obtain higher average prices than are received by other producers similarly situated.

Experience in connection with milk licenses also indicates that the provisions of these licenses affecting practices in the distribution of milk have been quite important as a means of improving the income of producers. For example, each license provides for check-testing and check-weighing services, which are designed to protect producers against unscrupulous practices. In some cases the reduction or elimination of transportation or other handling charges have been directly reflected in higher net prices to producers without any change in wholesale prices. It has also been possible to give producers more protection against credit losses through nonpayment by financially irresponsible dealers.

One Danger in Marketing Agreements

Some of the marketing agreements operate to raise prices by reducing the supply available for consumption. In these agreements there is frequently the danger, therefore, that those involved will make the same mistake that some urban industries have made—that they will curtail supplies excessively for the purpose of maintaining prices at too high a level. The nature of the farming business and the psychology of the farmers themselves are a partial safeguard against too great a restriction in volume. Furthermore, in the agreements which it has approved the Agricultural Adjustment Administration has taken great pains to avoid this unfortunate outcome. Nevertheless, it is to be expected that from time to time pressure will come from some agricultural groups operating under marketing agreements similar to that which is frequently exercised by certain groups interested in factory production.

PROTECTION OF CONSUMERS

It is expressly stipulated in the Agricultural Adjustment Act that the interests of consumers shall be protected. Farm production shall be adjusted, the act declares, "at such a level as will not increase the percentage of the consumers' retail expenditures for agricultural commodities, or products derived therefrom, which is returned to the farmer, above the percentage which was returned to the farmer in the pre-war period August 1909 to July 1914." In other words, for the protection of consumers, the measure sets a limit to the level to which farm commodity prices may be raised by crop adjustments or marketing agreements.

While, as consumers, people naturally desire that prices of things they buy shall be low, it is important to recognize that the permanent public welfare, including the welfare of consumers, suffers when prices are forced down to levels not consistent with efficiency in production and distribution. During the depression, farm commodities were available to consumers at very low prices. This resulted mainly from a fall of farmers' returns far below the profit line. It did not mean a permanent lowering of consumer costs, and there was involved in it no reduction in the margins of processors, distributors, or handlers. The reduction in consumer prices came almost entirely out of the farmers' returns. It was clear that, unless farm prices were brought back into balance with prices of goods bought by farmers, many farmers ultimately would be driven out of production, at which time consumers would have to pay unduly because of the resulting shortage of food. Consumers were suffering in another and more immediate way. The impairment of farm buying power caused unemployment in the cities and helped to bring about a general disorganization of the economic system. Thus the producer and consumer have both been victims of wide swings from surplus to scarcity, and of the extreme cycles of low and high prices.

The efforts of the Agricultural Adjustment Administration to raise the income of farmers in many cases involve higher prices to consumers. But so long as these increases are not diverted into non-farm channels and so long as the share of the consumers' dollar received by farmers is not greater than that received by them in the pre-war period, this does not conflict in any way with legitimate protection of the consumers' interests. On the other hand, the increased income received by farmers actually helps consumers because it means increased buying of city-made goods by farmers, increased employment, and increased business activity all around.

Consumers, in other words, derive their fair share of the general advantage that results from a healthy economic condition in agriculture which is based upon fair prices to farmers. Reasonable remuneration of agriculture for providing the Nation with its food and fibers is not a burden upon consumers so much as it is an assurance to them that efficient production at fair cost will continue.

Interdependence of Farmer and Consumer

But just as there can be no more than a false or transitory advantage to consumers in ruinously low farm prices, there also is no enduring gain for agriculture in discriminations against the consumers. Farmers generally show a growing understanding that agriculture relies, for sustained progress, upon rising consumer buying power. This interdependence of farmer and consumer is a vital factor to be considered in planning all steps for economic recovery.

The Consumers' Counsel of the Agricultural Adjustment Administration has undertaken to provide protection for consumers under the provisions written into the Adjustment Act. Its work is a specific recognition of the mutual interests of farmers and consumers. Scrutiny of pending adjustment programs, marketing agreements, and codes from the point of view of consumer welfare, and examination of their economic effects on consumers, after they

are in operation, are special functions of the Consumers' Counsel. The Consumers' Counsel represents the consumer interest in public hearings on agreements and codes, and advises the administration in the drafting of their provisions as they affect the consumer. It is important that provisions in marketing agreements and codes shall not be employed either openly or covertly to convey governmental sanction of excessive margins of processors and distributors, to widen spreads which already may be unjustifiable on economic grounds, or to disregard in any way the consumer or public interest in trade arrangements between organized producers and processors.

The Consumers' Counsel has proved increasingly useful in its functions. It has protected consumers by giving publicity in instances where efforts were made to pyramid processing taxes and so to make these taxes an excuse for profiteering under cover of adjustment programs undertaken by the Administration in the interests of farmers. As a matter of routine, the Consumers' Counsel tabulates and makes public information on the current consumers' prices of farm goods, and the relationship between those prices and the farm prices for the same commodities. In general, though the Consumers' Counsel is new and experimental, it may be said in all its work to emphasize usefully a very important principle—that recovery is not simply an affair of monetary gains, but that such gains must be translated into real income for the community as a whole.

PROCESSING TAXES

Few, if any, taxes have been popular. But most of us realize that if we abolished taxes we should at the same time abolish police protection, public schools, public roads, and many other necessary things. If we abolish the processing taxes, with nothing to take their place, we shall have to abandon our efforts to balance farm production with the market demand under the Agricultural Adjustment Act.

What actually happened to farm prices, to city retail prices and to processors' and dealers' margins after the processing taxes went into effect? Preliminary studies made in the Department of Agriculture were reported in *Agricultural Adjustment: A Report of Administration of the Agricultural Adjustment Act, May 1933 to February 1934*. Preliminary studies made by other research organizations have appeared in technical publications such as the *Journal of Farm Economics*. Such studies, though as yet incomplete, agree in their general conclusions.

They indicate—

(1) That the margins of processors and dealers (the spread between the prices they pay to the farmer and the prices they charge to the consumer) have been generally widened just about enough to cover the payment of the processing taxes and other increased costs, such as higher wage levels. There is little evidence of pyramiding except in a few industries and over short periods. Thus, the only possible loss sustained by processors and middlemen on account of the crop-adjustment programs is from a reduction in the amount of their business.

(2) That, considering the combined effects of reduced production, the collection of the processing taxes, and the payment of bene-

fits to farmers, the net result has been to increase prices paid by consumers and to increase the incomes (including market prices and benefit payments) received by farmers cooperating in the adjustment programs.

Effects Upon the Consumer

City retail prices of food from the low point in March 1933 to June 1934 rose 20 percent. Not all of this rise resulted from the processing tax-production adjustment program. Part of it was due to short crops of wheat and potatoes, part to the devaluation of the dollar and the resulting rise in the prices of export commodities, and part to an improvement in consumer buying power. During this same period pay rolls in manufacturing industries went up much more than did food prices. Similar comparisons based on other months give the same general conclusions—that incomes of wage earners in the cities have increased more than have the prices of foods.

The wheat tax of 30 cents a bushel represents about three-fourths of a cent a pound of flour which sells in city stores for about 5 cents, or about one-half cent on a pound loaf of bread costing the consumer an average of 8.9 cents on August 14, 1934. The cotton tax of 4.2 cents a pound represents about 8 cents on a pair of overalls costing \$1.60; less than 8 cents on a sheet costing \$1.30; about 3½ cents on work shirts costing 90 cents; or about 1.1 cents on a yard of unbleached muslin selling for 14 cents. The hog tax of \$2.25 represents about 4½ cents on a pound of retail pork cuts. The Bureau of Labor Statistics reported that on August 14, 1934, sliced ham cost consumers an average of 39.6 cents; picnics, 15.6 cents; loin roast, 20.6 cents; sliced bacon, 29.8 cents; and lard, 11.3 cents. It will be seen that in all cases the processing tax accounts for only a small part of the prices paid by consumers for farm products.

Two provisions in the Agricultural Adjustment Act protect the consumer against excessive increases in food prices. The use of processing taxes, production adjustments, and benefit payments is limited (1) to restoring the purchasing power of farm products to the pre-war relationship, and (2) to restoring to the farmer the pre-war percentage of the consumers' dollar. These provisions are a definite safeguard against any unfair or exorbitant increases in the prices of food or other agricultural goods as a result either of processing taxes or of production adjustments. Moreover, the city worker will benefit indirectly but surely from an improvement in the farmers' buying power.

High Cost of Doing Nothing

Farm readjustments could be made without benefit payments, and therefore without the use of processing taxes, if we were willing to pay the price. From past experience, however, we may be sure that, unless the farmers were helped or forced to make such adjustments, they would be made too slowly. Meantime, hundreds of thousands of farm families would be pauperized, and the depression in both town and country would be indefinitely prolonged. One possible method of bringing back a desirable balance between production and

consumption would be a policy of not interfering with the working out of economic laws. If the prices of wheat, cotton, hogs, and other agricultural commodities fell low enough and stayed low long enough, many farmers would be forced to give up their farms. This would reduce production. Thus a balance between production and consumption would gradually be brought about without any assistance from the Government. But thousands of farm families would be left destitute if the Government adopted the policy of not interfering.

Instead of leaving necessary adjustments to the individual farmer, the Government might compel him to make them, or might penalize a refusal to make them. It might license all farmers and regulate their acreages and the number of their farm animals. This would be a direct attack on the problem, which might bring about necessary readjustments in a short time. It is doubtful, however, whether farmers would accept such compulsory regulation, except as a last resort. Compulsory regulation should not be attempted if readjustments can be accomplished through voluntary cooperation. In no case should it be attempted unless practically all farmers want it.

The farmer who is not willing to cooperate in production adjustments might be penalized by taxes or by other means. This would not amount to compulsory regulation. No farmer would be compelled to adjust his production. But the penalty for declining might be so severe that he would prefer to make the necessary adjustments.

The principal method followed up to the present is that of voluntary cooperation, with the payment of benefits to the cooperator. It is supplemented this year, in the cases of cotton and tobacco, by penalties on the noncooperator. Processing taxes are the only source of revenue from which the benefit payments are made. If processing taxes should be abolished, no substitute being provided, there could be no benefit payments. The whole adjustment program would be at an end. Critics of the processing taxes have not suggested any other means of financing the adjustment of production. Some alternative must be found before we can consider dropping the processing taxes.

Some Advantages of Processing Taxes

The processing taxes have advantages over other kinds of taxes.

They are easy and inexpensive to collect and difficult to evade. The revenue obtainable can be forecast with a high degree of accuracy. It is doubtful if any other form of tax would offer as sure and steady a source of revenue. Furthermore, the processing taxes apply only to the domestically consumed portion of the products taxed. They do not penalize the exporter. The farmer is not taxed on his production of foods processed for his own use. Also, the rates of the processing taxes can be easily and quickly adjusted to meet changing market conditions. Such flexibility would be difficult to achieve with other methods of getting revenue.

In the case of hogs, the processing tax tends to penalize the noncooperator. Unless supplies are reduced it falls, to some extent, at any rate, on the producer. The cooperating farmer receives compensation in benefit payments. The noncooperator, of course, does

not. And in addition, he has to wait until the market supplies are reduced by the adjustments of cooperating farmers before getting any relief in the shape of higher prices.

Some Disadvantages

There are also some disadvantages in the processing taxes.

Some economists maintain it is wrong to tax raw materials and contend that the tax should be imposed only on finished goods. They believe a tax on raw materials is pyramided, so that prices to the consumer are raised by much more than the amount of the tax. But, as was said earlier, there is very little evidence of any general pyramiding of the processing taxes.

The processing taxes may tend to lower the prices of some farm products below the levels which might exist if the adjustment program were financed by some other means. But this may induce more farmers to cooperate in production adjustments. Benefit payments and adjustments of production furnish adequate compensation.

Perhaps the most common objection to the processing taxes is that they increase retail prices. Studies indicate that practically all the wheat processing tax and most of the cotton processing tax pass to the consumer in the form of higher retail prices. Heavy Federal purchases of hogs were necessary when the hog processing tax first went into effect to sustain the market price of hogs so that the tax would not fall mostly on the producer. With reduced supplies resulting from the adjustment program, the tax is now being shifted to the consumer without the support of Federal buying in the market.

Wherever the adjustment program is successful, it will mean either higher retail prices or a decided reduction in the charges of dealers and processors. These intervening charges are very high, and means to reduce them should be sought. But the problem is difficult and complicated. So far no one has proposed a workable plan for a general reduction of the costs of transportation, processing, and marketing. Meantime the only way of increasing farm prices is through the increase of city retail prices. Fortunately a moderate increase in retail prices generally means a substantial increase in the prices received by farmers. Prices high enough to make farming pay are necessary. Such prices should not involve any injustice to the consumer.

The Most Serious Objections

The most serious objection to the processing tax, and one which merits careful consideration, is that the greatest burden falls on the poorer people. This is an important and legitimate criticism of the processing taxes. It should be remembered, however, that in proportion as the farm adjustment succeeds it will stimulate urban employment. This will furnish an important offset to any rise that may take place in the cost of living.

It might be possible to obtain the revenue necessary for benefit payments either by increasing the rates of existing Federal taxes or by providing for some new form of tax. Two possible sources of revenue would be: (1) an increase in the rates of income taxes and

(2) a sales tax applied either to all commodities or to a group of commodities which might be classified as luxuries. If provision were made for financing benefit payments either from increased income taxes or from a general sales tax, the program would not be so great a burden on poorer people as is the processing tax.

Another source of revenue would be a tax on the profits of processors and distributors of farm products, or possibly a general tax on the profits of industrial concerns. It would be difficult for middlemen to avoid a substantial part of the burden of such a tax and it probably would have a tendency to reduce middlemen's charges and to bring about a narrower spread between the farm prices and the city prices of some commodities. Theoretically there is merit in such a tax. Practically, it would be difficult to work out satisfactorily. The income which might be obtained would be uncertain and would vary greatly from year to year.

Alternatives Should Be Considered

However, there should be careful consideration of possible alternatives to the processing taxes. There may be other possible methods in addition to those above outlined. The ideal requirement is a method which will provide adequate and sure revenue, which will be easy and inexpensive to administer, and which will not unduly burden consumers of low income.

FARM REAL ESTATE TAXES

Measurable relief from taxes came to agriculture in 1933, and 1934 promises additional relief. Farm real estate taxes reached a peak in the United States in 1929. In that year the average tax per acre for the country as a whole was 58 cents. This may be compared with an average of 24 cents in 1913. After 1929 the average farm realty tax per acre began to decline. In 1932 it stood at 46 cents, or 21 percent below 1929. Between 1932 and 1933 there was an additional reduction of about 6 cents an acre, judging from data already assembled from 23 States. Probably the average tax per acre for 1933 was about 39 cents, or 33 percent less than it was in 1929.

Naturally the tax reduction varied by States and regions. In California, for example, average farm real estate taxes per acre decreased from 94 cents in 1932 to 65 cents in 1933. On the other hand, in Mississippi the tax increased from 52 cents to 55 cents. Generally, the greatest reductions took place in the far Western and Middle Western States. Part of it resulted from a curtailment of social services and from salary cuts. In some States public borrowing permitted tax reductions. Farmers in many States obtained partial relief from the general-property tax through State laws providing revenue from other sources.

Nine States in 1933 allocated the proceeds of sales taxes to the support of public schools. Two States diverted to the schools the proceeds from increases in taxes on gasoline and lubricating oils. Three States provided that all or part of the revenue from newly levied income taxes should be devoted to the public schools. Federal funds to supplement teachers' salaries became available in 1934.

Possibly farm taxes would have been reduced without this State and Federal assistance to the schools, but the rural school system would have suffered. Because the aid was forthcoming, the proportion of the total cost of government borne by the general-property tax was reduced.

Besides benefitting from a reduction in the amount of their taxes, farmers benefited from a decrease in the burdensomeness of the charges. They had more income with which to pay. Individual taxpayers find taxes bearable or not as their income varies. Hence the better measure of farm-tax burdens is not the amount levied per acre but the proportion that the taxes constitute of the gross farm income. Between 1932 and 1933 the gross farm income per acre increased more than 20 percent, while at the same time the real-estate tax per acre decreased between 10 and 15 percent. Hence the tax per \$100 of gross income in 1933 was only about two-thirds what it was in 1932 and about the same as in 1930.

Farm Aid Through Taxation

Farm taxation, however, is only a part of the broader field of public finance. In the last year and a half farmers have seen this fact emphasized in ways to their advantage. They have had good reasons in the past to complain about the distribution of tax burdens. Excessive dependence on the general-property tax by State and local governments has frequently hurt them. Under new Federal legislation, notably the Agricultural Adjustment Act, taxation furnishes direct benefits to agriculture. Revenue for the rental and benefit payments which last year increased the gross farm income by one-fifth came from processing taxes. Benefit resulted to agriculture also from another change in public finance, namely, monetary devaluation, which raised prices and redistributed wealth to the farmers' advantage.

Federal expenditures, dependent as the last resort on taxation, benefited agriculture by relieving unemployment. Food and work furnished to the unemployed increased consumption and helped to raise farm prices. Federal funds for these purposes did not involve any increase in direct taxation of agriculture, since they did not come from taxes on general property. Federal, State, and local policies reduced farm-tax burdens during 1933 and 1934 in three distinct ways. They reduced tax charges absolutely, raised farm prices, and thereby enhanced the farmer's power to pay the remaining taxes, and tapped new sources of revenues for direct and indirect agricultural relief.

COTTON

When the Agricultural Adjustment Administration initiated the cotton-adjustment program in 1933 cotton was selling at about 6 cents a pound on the farm. The world supply of American cotton was about 26,000,000 bales, and had been near that record level for 2 years. Furthermore, cotton acreage had increased tremendously. Many farmers had no other cash crops to which they could turn, and low returns from cotton impelled them to increase their production in order to meet, as nearly as possible, their cash expenses inci-

dent to production and living. Labor drifting from the cities to the cotton States also strengthened the impulse to grow more cotton. As the season advanced, it became evident that the large acreage and good growing conditions would result in a big crop. Had cotton reached maturity on the entire acreage planted the output would have exceeded 17,000,000 bales. The world's supply of American cotton would have been more than 29,000,000 bales. The cotton-adjustment program for 1933, therefore, aimed to withdraw 10,000,000 acres from production, or the equivalent of 3,000,000 bales. A considerably greater adjustment was desirable and would have been attempted had circumstances permitted. Actually the program resulted in a withdrawal from cotton production of 10,500,000 acres, on which area average 1933 yields would have given 4,500,000 bales.

For withdrawing this land from production, 1,032,000 producers received from the Government approximately \$112,600,000. They also received options on a quantity of Government-owned cotton, on which they made a profit of more than \$50,000,000. The 1933 cotton crop was limited to 13,047,000 bales, and the world's supply was reduced from 26,000,000 to 24,600,000 bales. This adjustment, with an improvement in the demand for cotton and with the reduction in the gold content of the dollar, raised the average farm price of cotton for the 1933-34 season to 9.7 cents per pound, as compared with an average of 6.5 cents per pound received for the 1932-33 crop. The farm value of the 1933-34 crop was \$717,007,000, as against \$483,912,000 in 1932-33. Including benefit payments and profits on options, the gross farm value of the 1933-34 crop was nearly \$880,097,000.

After a series of meetings with farmers and others interested in the price and production of cotton, the Agricultural Adjustment Administration formulated a program for 1934 which called for an acreage reduction of approximately 40 percent of the average acreage planted to cotton during the period 1928-32. The campaign was launched in January 1934, and approximately 1,000,000 producers contracted to keep roughly 15,000,000 acres out of cotton production. The reductions constituted about 38 percent of the base acreage of the cooperating producers.

Payments to Producers

Payments to producers, as compensation for this reduction, were of two types. There was a rental payment amounting to 3½ cents per pound on the average per acre yield of the land taken out of production, and a parity payment, guaranteed to be not less than 1 cent a pound on the domestically consumed proportion of the base production. The domestic consumption of cotton during the base period, 1928-32, averaged 40 percent of the production. The contracts stipulated that managing share tenants should receive half of the rental payment, and that all tenants, including croppers, should share in the parity payments to the same extent that they shared in the crop. The total rental payments will be about \$90,000,000 and the parity payments around \$27,000,000, giving a total compensation from the Government to the farmers for the 1934 cotton acreage reduction of something like \$117,000,000.

During the course of the 1934-35 sign-up campaign legislation was introduced in the Congress for the purpose of making compulsory the cooperation of all cotton producers in production-adjustment programs. This legislation seemed to meet with widespread support among cotton farmers, particularly contract signers. The Secretary of Agriculture, in order to ascertain the true sentiment of cotton producers, sent out more than 40,000 questionnaires in January 1934 to representative cotton producers requesting their opinion regarding legislation then pending in Congress designed to limit within an estimated market demand the quantity of cotton that could be ginned and sold in any one year.

The results of the questionnaire survey indicated that an overwhelming majority of cotton producers favored compulsory control of production. Congress passed the Cotton Act, commonly known as the Bankhead Act, on April 21, 1934. It represents a plan that met with the approval of the majority of cotton producers heard from in the questionnaire survey. The measure is effective for 1 crop year, from June 1, 1934, to May 31, 1935, and for a second crop year should the President find that a continuation of the emergency requires it and that the Secretary of Agriculture finds that two-thirds of the cotton producers favor it.

Specifically, the Bankhead Act provides that 10,000,000 bales (500 pounds net weight) may be ginned free of the ginning tax in the crop year 1934-35. This amount of tax-exempt cotton is allotted to individual farms on the basis of the production history of each farm. The act also exempts cotton of 1½-inch staple length and cotton produced on publicly owned agricultural experiment stations. Other cotton above the 10,000,000-bale exemption is subject to a tax of 50 percent of the average central market price of 7/8-inch Middling spot cotton. In any case, the tax is to be not less than 5 cents per pound.

As a result of the voluntary adjustment and of action under the compulsory features of the Bankhead Act, approximately only 28,000,000 acres were planted to cotton in 1934. Low yields on this reduced acreage produced a crop estimated in October at 9,443,000 bales. The world supply of American cotton for the 1934-35 cotton marketing year will be below 20,000,000 bales, as contrasted with 26,000,000 bales when the adjustment programs started. The changed supply position caused a sharp advance in cotton prices. In August 1934 the farm price averaged 13.1 cents a pound.

A Long-Time Cotton Program

In a program designed to increase the returns of American cotton growers, not merely for a single season but for a long period, it is necessary to determine the point to which cotton prices may be raised without unduly stimulating foreign competition. Cotton production in this country has been developed to meet the demands of the world market. Ordinarily we sell more than half our crop abroad. Loss of this foreign market would force cotton growers to cut their acreage to less than half its normal size. In formulating the adjustment program for 1933 and for 1934 the administration did not ignore the possible effect on foreign competition. With an immense carry-over in existence, however, the danger of causing important

foreign expansion was not imminent. Acreage reduction in the United States was appropriate for 1933 and for 1934. But it is obvious that a policy based on the existence of a large surplus may need to be changed as the surplus disappears. In what manner and to what extent our cotton production should be adjusted to the supply situation as it now stands should be carefully considered.

More than 50 foreign countries grow cotton, and their producers react to price changes just as ours do. In the period 1921-25, when bollweevil damage in this country threw doubt on our ability to continue supplying the world demand, foreign cotton acreage, excluding that of Russia, rose from 28,200,000 acres to about 40,800,000 acres or 45 percent. A part of that increase would have occurred, even with normal crops in the United States, since the depression and low prices of 1920 and 1921 resulted in an acreage in foreign countries in 1921 somewhat smaller than in the years immediately preceding. Following the price slump of 1929 foreign acreage declined, but it was increased by more than 4,000,000 acres in the 1933-34 season, when it was the largest on record. However, the estimated 1933-34 foreign acreage excluding Russia, whose marked expansion in cotton acreage under the Soviet Government has been independent of the movement of prices in the markets of the world, was somewhat less than the previous peak. Early reports indicate that there was probably a further increase in foreign acreage from which the 1934-35 crop is being harvested. There are possibilities for substantial cotton-acreage expansion in India, Africa, Russia, China, and South America, and the extent of the expansion which occurs will depend to a considerable extent upon prices.

Foreign Competition Should Not Be Overemphasized

American growers should bear these facts in mind, without overestimating their significance. They do not warrant a return to unregulated production in order to hold this country's position in the world market. Foreign cotton production, in many countries, meets with great difficulties of climate, soil, labor, and transportation. Cotton production cannot be expanded very rapidly in these countries. It is easier for the United States than for the competing countries to adjust the output of cotton to a rising demand. No single large area anywhere else in the world is so well adapted to cotton production as the southern part of the United States. Our natural advantages in the production of this crop do not vanish when we eliminate the irregularities of supplies and adopt a program of production control. Production control is not a matter of rushing from one extreme to the other—but simply of continuing to adjust the production to the demand, foreign and domestic.

Specifically, the problem is to ascertain, as nearly as possible, the quantity of cotton that will give the best net return—not for 1 year or for 2, but for a long time. By curtailing production very greatly, we could temporarily raise the price of cotton to a high level. Simultaneously, however, this would encourage foreign competition. Opinions vary as to the price that would strongly stimulate foreign expansion. Much depends upon the value of the dollar relative to gold and to the currencies of other countries, and upon the price of

cotton as compared with the prices of alternative products and with costs of production.

Up to the present the American cotton policy stands justified by its results. Foreign countries produced more cotton last year than they did the year before, but a large part of the increase would have occurred regardless of the cotton program in the United States, as most of the 1933-34 foreign crop had already been planted before our program was even decided upon. The prosperity of the American growers has been enormously enhanced by the adjustment programs conducted during the last 2 years, because these programs have helped to correct an unbalanced supply position. It does not follow that still more prosperity could be gained by creating an artificial shortage.

We wish to retain our foreign market; and this means that we must continue to supply it at moderate prices. But we do not wish to keep prices ruinously low on the assumption that any improvement through the elimination of the surplus will cause a loss of our foreign markets. We must not, therefore, permit an increase in foreign production to stampede us back into overplanting. Our cotton policy has succeeded thus far because it operated to make an adjustment to the demand. That is the formula for its success in the future. It will be more difficult to apply, now that the problem is to steer between extremes. The principle, however, remains unchanged.

WHEAT

In the wheat adjustment, two elements are equally important—the cooperation of American farmers and the foreign response. This country produces wheat partly for the world market. Normally, therefore, the world market determines the price both for the wheat exported and for the wheat consumed at home. In exceptional circumstances, such as those that have prevailed during recent years, the American price may rise above the world price. But this is a wholly abnormal relationship, which could not endure if a normal crop were sold in the usual way. Ordinarily we have a substantial surplus for export, and as long as that condition continues it is necessary to combine the adjustment of production at home with an effort to obtain supporting action abroad. The United States could not assume the entire burden of bringing world wheat production into line with the world demand. Without exports, we would have to reduce wheat acreage to about 75 percent of our previous average acreage, and that is a greater permanent reduction than it seems desirable to make. Furthermore, this action would not suffice for the world readjustment unless other countries took themselves in hand.

Accordingly, the Agricultural Adjustment Administration coupled its program for adjusting the American wheat acreage with an attempt to enlist the cooperation of other countries, both exporters and importers of wheat, in a world adjustment. Such an adjustment is possible. Taking the world as a whole, yields of wheat are remarkably stable from year to year, despite annual variations in the yields of different countries. In other words, in the long run man

is a very important factor in determining the production. The acreage as well as the weather is a governing factor. In recent years the world's wheat acreage has increased in spite of a declining world demand. Exporting countries and importing countries alike have an interest in promoting a more rational adjustment. This common interest found expression in the international wheat agreement of 1933, in the negotiation of which the United States took the initiative. Under the terms of this agreement, exporting countries accepted export quotas for the 1933-34 crop season and undertook to restrict their production in 1934, while importing countries promised not to encourage further wheat expansion within their own borders and to diminish their import restrictions as wheat prices advanced. The arrangement, a logical counterpart of our acreage adjustment, encouraged the hope of effective world cooperation.

Influence of Weather Conditions

Unfortunately weather conditions in both hemispheres upset all calculations last year, and to a still greater extent this year. Seasonal conditions do not affect the logic of acreage adjustment for the long pull, but they may seriously interfere with immediate action. Drought in the United States reduced the 1933 wheat crop to less than 528,000,000 bushels, as compared with 932,221,000 bushels in 1931. On the other hand certain other countries, notably Argentina, had unexpectedly large crops, while France, Germany, and Italy, had phenomenally large crops for the second year in succession. This change in the situation prevented universal adherence to the export quotas fixed in the international agreement. Argentina would have had to denature a large part of its crop in order to comply with the pact, which required a reduction of shipments without any increase in the carry-over. Argentina declared itself unable to do this, and requested a readjustment of the quota. It proved impossible to reach an agreement before Argentina had to begin seeding wheat for the 1934 crop. In consequence Argentina has not made the promised adjustment in production for 1934.

But the agreement was successful in that wheat acreage in 1934 dropped not only in the United States but in Canada and Australia, and even to a slight extent in Argentina. Certain wheat-importing countries, including Italy, France, and Germany, reduced their acreage likewise. France and Italy conducted reduction campaigns, and France passed acreage-restriction laws. The influence of all these reductions combined, however, was negligible in reducing production, as compared with the influence of unfavorable weather in many countries. In 40 countries of the Northern Hemisphere, the estimated wheat production for 1934 is only 2,878,768,000 bushels, as compared with 3,149,007,000 bushels in the same countries last year. In the United States the crop was below 500,000,000 bushels, the smallest in 40 years. It fell over 100,000,000 bushels below domestic requirements, and foreshadowed a reduction of our domestic carry-over to normal by the end of the 1934-35 marketing season. This tremendous change in the supply position naturally lessens the immediate need for acreage adjustments, and makes world cooperation toward that end more difficult to achieve.

Elimination of the wheat surplus in the United States by 1935 is a possibility. Acreage adjustments and the weather have done in 2 years the larger part of a job that seemed likely to take 5 or 6. In consequence, wheat prices have risen. The average farm price in the United States in September 1934, was 92.2 cents a bushel, as compared with 32.9 cents in January 1933. But rising prices do not benefit farmers with little or nothing to sell. There is more calamity than benefit in the adjustment of supplies through drought. Yet acreage tends to rise if prices do, and acreage adjustment will be more difficult than it was before the surplus disappeared. Continued restriction of the American wheat acreage will be justified if competing countries likewise recognize the need for acreage adjustments, but not otherwise.

Limitations of Reduction Policy

Only by putting our wheat industry completely on a domestic basis could farmers get permanent price gains through acreage restrictions alone. Putting it on a domestic basis would be very difficult; for temporary price gains would tempt farmers back into large production for export. Lacking world cooperation, the United States will have to reconsider its whole wheat program, and possibly to contemplate renewed production for export at highly competitive world prices. Within the United States returns to wheat farmers could be maintained above the world level, through making adjustment payments under the Agricultural Adjustment Act. Now that the wheat surplus of the depression period has disappeared, we must adjust the production with an eye to the whole situation, both foreign and domestic, and should not commit ourselves to a program of indefinite restriction, regardless of conditions abroad.

Within the United States the wheat-adjustment campaign has definitely increased the income of wheat farmers. Through processing taxes, the plan has paid its way. Growers have done their part, and the administration has distributed among them adjustment payments totaling more than \$98,600,000. This sum was due on the 1933 crop, in accordance with the terms of acreage-reduction contracts. It was paid in two installments. In 1933 a sign-up campaign brought the growers of nearly 80 percent of the Nation's wheat into cooperative production adjustment. They undertook in 1934 to reduce their acreage by 15 percent from the 1930-32 acreage, and by 10 percent in 1935. The contracts covered 585,000 farms, aggregating over 52,000,000 acres, or 80 percent of the average wheat acreage in the years 1930, 1931, and 1932. Participating farmers withdrew more than 8,000,000 acres. Other farmers, however, increased their wheat seedings, so that the net reduction in seedings was approximately 7,000,000 acres.

Under ordinary conditions this reduction in acreage would have reduced the season's crop by at least 85,000,000 bushels. Drought of extraordinary extent and severity overshadowed the acreage reduction, and caused a far greater reduction in actual output. Under the adjustment program the return from wheat to cooperating farmers is the market price plus the adjustment payment. For the 1933 crop the farmers received average prices which, with the adjustment

payments, brought returns for the domestically consumed portion very close to parity. The short crop of 1933, from which only 368,000,000 bushels were marketed, brought a cash income of \$267,000,000 exclusive of the adjustment payments. The much larger crop of 1932, from which about 524,000,000 bushels were marketed, brought a cash income of about \$195,000,000. This is an excellent illustration of the fact that moderate crops tend to bring in more money than do very large crops. It emphasizes the necessity of continued adjustment. From the still smaller 1934 crop, the growers will get about as much or more than they got from the 1933 crop. The adjustment payments will be unaffected. These payments constitute partial crop insurance. The adjustment checks are the only income some growers will receive in 1934.

Adjustment Payments For 1934-35

For the 1934-35 crop year the administration will make adjustment payments on the same basis as it did this year. These payments will total not less than 29 cents per allotted bushel. The acreage reduction required will be 10 percent of the base acreage, and the wheat-processing tax will remain at 30 cents a bushel. Probably the adjustment machinery will work better. Farmers have the necessary organization. They understand the program, and have acquired administrative experience. In 1934 they organized 1,400 local production control associations to administer the adjustment plan in 1,757 counties. Cooperating with Federal and State officials, they put through 585,000 contracts so efficiently that only 1,413 remained unsettled on September 15, 1934. Most of these unsettled cases reflect unforeseen circumstances or legal complications. There have been very few willful violations of the contracts. There should be even fewer administrative difficulties in the future.

Nothing that has happened this year detracts from the value of the wheat adjustment. True, drought has reduced the output far more than the acreage cut alone would have done, and has emphasized the need for reserves against crop failure. It has not changed the logic of adjusting production to the probable demand. Adjustment as such remains a desirable condition, though it may come about in undesirable and painful ways. Had wheat acreage not been curtailed by the acreage reduction, the 1934 crop would have been somewhat larger; but the growers would have been worse off. As things were, many farmers received more income from each acre withdrawn than from each acre seeded. In the sections hardest hit, production would have been practically no greater had all the land been seeded to wheat, and forage production would have been less. The adjustment program furnished important crop insurance to producers while from the standpoint of the consumer it left the situation not greatly changed. There is enough wheat in the country for domestic consumption, but the surplus has been eliminated.

CORN AND HOGS

For several years prior to the passage of the Agricultural Adjustment Act corn and hog producers in the United States far over-

supplied the demand for their goods. They had in corn about 15 million acres above reasonable requirements. They were sending to market annually millions of hogs more than the market could absorb at remunerative prices. Foreign takings of our hog products had declined so much more than our production that from seven to eight million hogs, which previously would have gone abroad annually, had to be sold in the domestic market. As a result the purchasing power of corn and hogs was less than half the pre-war average. It was too late, when the Adjustment Act was signed, to prevent another overplanting of corn. Moreover, a spring pig crop 4 percent larger than that of 1932 had been farrowed. But unfavorable weather over part of the Corn Belt indicated that the corn crop would probably be small. It was therefore not imperative to act immediately for reduction of the corn output. In the case of hogs, on the other hand, the situation in 1933 called for immediate action.

The increased number of hogs already farrowed and in the fattening pens, and the comparatively larger number of sows already bred for fall farrowing, foreshadowed heavy production. The June 1 pig survey showed a 13-percent increase over 1932 in sows bred to farrow in the fall. Accordingly, after consulting representatives of the corn-hog producers, the Agricultural Adjustment Administration launched an emergency program to reduce pig and sow numbers. In August 1933 it began buying pigs weighing from 25 to 100 pounds under a schedule of minimum prices, and also sows weighing not less than 275 pounds and due to farrow, at their regular daily prices for packing sows on the animal's full weight plus a bonus of \$4 a head. In a buying program extending through September the administration purchased 6,188,717 pigs and 223,247 sows due to farrow. Many packing concerns at 80 points acted for the administration in these transactions. About 1,833,650 head of the pigs were large enough to process into meat. The lighter pigs yielded fertilizer, tankage, and inedible grease. Meat obtained from the heavier pigs and from the sows totaled more than 100 million pounds. It was distributed to needy families through the Federal Emergency Relief Administration.

This emergency program reduced market supplies of hog products for the 1933-34 season by more than 1 billion pounds, or about 10 percent of the average annual production. Toward the end of 1933 and during the early part of 1934 the Federal Surplus Relief Corporation purchased directly about 1,400,000 live hogs and approximately 100 million pounds of lard and cured products. These operations helped to keep hog products on a higher level through the winter and spring of 1933-34 than they would otherwise have held.

More Permanent Program

Then the administration considered a more permanent corn-hog program. In the past the gross value of the corn crop has been greatest in years of production 10 to 20 percent below the average normal. This fact, together with changes in the corn-hog situation in recent years, made it desirable that corn production for the United States as a whole in 1934 should be reduced 15 percent or more below the average for the 2 preceding years. In hog numbers a reduction

of approximately 20 percent seemed desirable. The administration called these facts to the attention of producers and in consultation with their representatives drew up an adjustment program. It was improbable that all producers would participate. Therefore, in order to obtain the desired adjustment, the administration offered the growers a contract requiring the individual signer to reduce his corn acreage by 20 percent and his hog production by 25 percent. The contract was ready early in 1934, by which time county and community committees of producers had been organized to facilitate local administration of the work.

Approximately 1,160,000 producers, representing all the States, signed the contracts. In the Middle West, where the bulk of the commercial supplies of corn and hogs are grown, the contracts covered from 75 to 85 percent of the average annual production. On the acreage withheld from corn production, participating producers received payments from the Government at the rate of 30 cents a bushel on the estimated yield. For the reduction in hog numbers they received \$5 per head for each 3 out of 4 head of hogs raised on the average from litters farrowed during the 2-year base period, December 1, 1931, to December 1, 1933. As in the case of the cotton-, wheat-, and tobacco-adjustment programs, funds for the corn-hog production payments came from processing taxes.

The 1934 corn acreage was materially reduced below the 1932-33 acreage. According to the July crop report it totaled 92,526,000 planted acres—12.3 percent below the 2-year average. The acreage reduction in the North Central States was 18 percent of the 2-year average. However, the acreage reduction reduced corn output far less than did the drought. Corn production in 1934 dropped more than a billion bushels below the annual average of about 2,600,000,000 bushels. Only about 300 million bushels of the decrease can be attributed to the average-reduction contracts.

Factors in Corn-and-Hog Income

Income from corn and hogs depends on several important variable factors, the separate influence of which cannot be accurately measured. Adjustments in supply are, of course, important. But there are other important factors, such as processors' and meat distributors' margins, marketing costs, consumers' incomes, and consumers' expenditures for pork and lard. On a given level of purchasing power, consumers as a group tend to spend annually about the same percentage of their incomes for pork and lard. In other words, their consumption of hog products varies inversely with the prices. On the other hand, the total amount of money taken for processing, distribution, and transportation varies directly, within reasonable limits, with the volume of hogs marketed. These conflicting tendencies complicate the problem of reckoning the specific influence of the supply adjustment. It must be remembered, too, that the early sale of pigs and sows saved about 70 million bushels of corn. The closest reckoning that can be made indicates that the net benefit of the emergency and supplemental-purchase programs substantially exceeded their costs.

Essentially the emergency program was a price-supporting and not a price-raising measure. It did not immediately bring about

hog-price gains. It is extremely probable, however, that without the emergency program hog prices during the winter and spring of 1933-34 would have been below the extremely low price of December 1932. Marketings in November and December 1933 and January 1934 were very heavy, yet prices did not show more than an expected seasonal decline. It is not yet possible to estimate, with any approach to accuracy, the economic effects of the 1934 adjustment in corn and hog production. Not until the crops of hogs and corn of that period have been sold will it be practicable to figure out the results. Present indications, however, are that the benefits will be very substantial.

For example, the total cost of hogs to packers operating under Federal inspection was greater during the first half of 1934 by about \$80,000,000, or 37.7 percent, than during the corresponding period of 1933. This cost figure included the processing tax which processors paid on all hogs slaughtered. The slaughter tonnage in the first half of 1934 was smaller than in the first half of 1933 by about 500,000,000 pounds, or 8.6 percent. For fewer hogs farmers received substantially more. In the first 6 months of 1934 the cost to packers per hundredweight of hogs slaughtered was \$5.60, as compared with only \$3.72 in the corresponding period of 1933. It should not be forgotten that the proceeds of the processing taxes went to producers in payments on their reduction contracts.

Supplementary Benefits of Adjustment

Besides improving the supply position and raising corn and hog prices, the adjustment programs yielded important supplementary benefits. Much of the acreage withdrawn from corn went into forage crops which resisted the drought better than corn would have done, and provided additional feed. Moreover, the emergency pig and sow program reduced hog production in advance of the drought. Hence it enabled farmers to carry forward to the 1934 and 1935 feeding seasons a considerable supply of corn that would otherwise have been consumed. In an unexpected manner, therefore, the emergency program forwarded production adjustment in the most constructive sense of the term. By conserving feed it mitigated the excessive influence of the drought upon hog production and shortened the swing of the pendulum. Also in areas where crops were almost completely wiped out and the livestock had to be sold, the reduction payments became crop insurance.

In October the Agricultural Adjustment Administration conducted referendum meetings to ascertain the views of producers as to the advisability of continuing the corn-hog adjustment through 1935. Forty-five States were represented in the voting. Approximately 69 percent of the farmers who voted declared themselves in favor of a follow-up program. Accordingly the Administration decided to offer a new plan as soon as the necessary provisions could be worked out. The plan will probably follow the general outline of the 1934 contract as to control requirements and benefit payments. Many local control associations arranged separate balloting for corn-hog farmers who did not sign contracts for 1934. One-third of the participants in this separate balloting voted in favor of a corn-

hog plan for 1934. The others voted "no." Taking 1934 signers and nonsigners together, the favorable vote averaged about 67 percent of the total vote. About one-half of the producers eligible to vote in the referendum did so.

DAIRY INDUSTRY'S PROBLEM

Dairy farmers benefit substantially from marketing agreements under the Agricultural Adjustment Act, but these agreements do not accomplish all that is necessary. They cannot deal broadly with production throughout our far-flung dairy industry. Drought this year reduced the dairy output temporarily, and lessened the immediate need for planned adjustments of production to market needs. Such adjustments will be necessary sooner or later, however, because the dairy industry has more production capacity than the market requires. It cannot achieve prosperity simply by regulating the flow of dairy products into the market. It will have to develop means of controlling the supply.

Dairying is the largest of our agricultural industries, and perhaps the most complex. It is carried on in all the States, under extremely varied regional conditions. Problems that seem local to the dairy-men immediately concerned are really national. Whatever affects the fluid-milk market affects also the market for butter and cheese and other milk products, and vice versa. Some areas have surpluses and others have deficits; and an adjustment program that appeals strongly to the surplus areas may not look satisfactory at all to the deficit areas. Actually, dairying is not a single industry, but a group of related industries, each capable of helping or hurting the others. Unlike some of the other basic agricultural industries covered in the Agricultural Adjustment Act, dairying is on practically a domestic basis. This makes it peculiarly dependent on the level of domestic purchasing power.

In considering means to raise the dairy industry from the depression into which it fell after 1929, the above-mentioned facts must be regarded as fundamental. Important also are recent developments in prices and production. In March 1933 the index number of the farm prices of dairy products was only 71 percent of the pre-war average, as compared with 157 percent in 1929. Since April 1933, however, the index has risen markedly. In September 1934 it stood at 99 percent of the pre-war average. The price gain resulted partly from the general improvement that has taken place in business conditions and partly from the influence of the 1934 drought. Milk production is lower now than it was a year ago, owing mainly to reduced production per cow. As yet there has been no great change in milk-cow numbers, which are considerably above market requirements. Between 1900 and 1934 the number of cows and heifers 2 years old and older kept for milk on farms increased 70.9 percent, or from 15,253,000 to 26,062,000. Consumer purchasing power does not yet exist to support profitably the normal production of so large a number.

Gap Between Production and Consumption

Between 1900 and 1929 the increase in cow numbers merely kept pace with the growth of population. During this period, moreover, the market expanded through an increase in consumption per capita as well as through the growth of population. After 1929, however, milk-cow numbers increased at a rate faster than that required to keep pace with the growth of population. Furthermore, the consumption per capita declined. A widening gap had opened between production and consumption. In certain geographic divisions the increase in cow numbers after 1900 was much more marked than in others. Thus in the West North Central States, the East North Central States, and the South Central States the increases between 1900 and 1934 were 96.2, 71.2, and 98.2 percent, respectively. Hardly any increase took place in the North Atlantic States. These regional differences constitute a stumbling block in the way of Nation-wide cooperation in production control.

It is noteworthy, too, that creamery-butter production increased from 1,054,938,000 pounds in 1931 to 1,752,343,000 pounds in 1933. A marked shift took place from the production of farm butter to the production of creamery butter. There was also a shift from the production of milk for the manufacture of creamery butter to the production of milk for fluid consumption. These changes, like the regional shifts in production, have a significant bearing on the adjustment problem. Overproduction of fluid milk forces more milk into butter and cheese production and complicates the relationship between the producers mainly of fluid milk and those who produce mainly for the manufacturing plants. When the demand for dairy products fell off and overproduction appeared toward the end of 1929 numerous conflicts of interest developed among various dairy groups. As dairy production continued to increase in the face of a declining demand, these differences increased likewise.

Following the passage of the Agricultural Adjustment Act means became available for mitigating the struggle of competing interests. In its original form and through subsequent amendments the measure authorized production-adjustment and benefit-payment programs, marketing agreements, the removal of surpluses from the market, and the elimination of cattle affected with Bang's disease and tuberculosis. The administration did not immediately launch a program for adjusting production, but it removed quantities of butter from the market and sponsored numerous marketing agreements. Conditions, nevertheless, became worse, and toward the end of 1933 were critical. Accordingly the administration, in consultation with representatives of the dairy industry, attempted to work out a production-adjustment program.

Temporary Benefit of Butter Purchasing

In undertaking the removal of surplus butter the administration recognized that the benefit could be only temporary. It acted at the request of dairy leaders, who pledged their support of a more thoroughgoing procedure looking to the regulation of production as well as of marketing. Through various channels, the administration

purchased 51,572,265 pounds of butter, including about 11,000,000 pounds through Land O'Lakes Creamery, Inc., a cooperative organization. Nearly all this butter, and also about 6,000,000 pounds of cheese similarly purchased, went into relief channels. The purchases reduced excessive storage holdings of butter and cheese without materially affecting the long-time situation as a whole. It had been expected that the dairy industry would follow up the surplus-removal program with a concerted attack on overproduction. Regional and other difficulties interfered.

In the spring of 1934 the administration invited dairy farmers and others concerned to offer proposals for improving the dairy situation. Many came in. They fell generally into the following categories: (1) Allotment-benefit payment plans; (2) restrictions on the production and sale of dairy products; (3) restrictions on the manufacture of oleomargarine; (4) reductions in cow numbers; (5) the drying-off of cows; (6) feed-reduction programs; and (7) Government advertising of dairy products. Some of these proposals were economically unsound. Others were beyond the scope of the Agricultural Adjustment Act. Others could not furnish quick results, and still others could not apply to the dairy industry as a whole. Finally, the administration offered an adjustment program for consideration by farmers at regional meetings.

The program contemplated benefit payments to farmers who signed contracts agreeing to reduce their sales. They were to reduce their marketings from 10 to 20 percent, and were to get payments of approximately 40 cents a pound on the poundage of milk reduced below their base poundage. It was estimated that the benefit payments would have totaled about \$135,000,000. Funds to pay them would have been derived from a processing tax of 5 cents a pound on all sales of butterfat in all forms, and from a compensating tax on oleomargarine. It seemed, when the administration offered this program, that continued heavy overproduction of milk was inevitable. It was, of course, impossible to anticipate the drought, and production under normal conditions would have greatly exceeded requirements.

Dairymen Not United

Dairy farmers, however, were not sufficiently united in favor of the program. In fact, they appeared to be about equally divided for and against it, or against parts of it. It is a fixed rule of the Agricultural Adjustment Administration that no program shall be put into effect unless a substantial majority of the producers affected indicate their intention to cooperate. Accordingly the plan was held in abeyance. Since then milk production has been so reduced by the drought that no general dairy adjustment program was needed during 1934. Reduced pasture and short feed supplies are tending to hold down production, and may even result in supplies smaller than would have been obtained by the proposed sales-reduction program. Prices of dairy products may go higher than they would have done under the program, and higher than is desirable. Nevertheless the benefit will not be distributed equitably among producers. It will go largely to those not affected by the drought.

Action under the Agricultural Adjustment Act to improve dairy conditions now includes simply: (1) The issuance of licenses setting minimum prices to producers and carrying market stabilization features; (2) the development or administration of marketing agreements for the butter, evaporated milk, and dry-skim-milk industries; (3) purchases of butter and cheese for distribution through relief channels; and (4) the removal of cattle afflicted with Bang's disease and bovine tuberculosis. Cattle buying in the drought-relief program of 1934 included, of course, the purchase of many dairy cattle, but mainly this took the place of normal culling.

Elimination of Diseased Cattle

The La Follette amendment to the Jones-Connally Act appropriated \$50,000,000 to be used (1) in the elimination of cattle affected with Bang's disease and bovine tuberculosis, and (2) in the removal of surplus dairy and beef products. Of \$30,000,000 tentatively allotted to disease projects, \$17,000,000 has been set aside for the elimination of cattle affected with Bang's disease, and \$12,000,000 for the elimination of those affected with bovine tuberculosis, \$1,000,000 remaining unallotted. Farmers signing contracts are to receive indemnity payments ranging up to \$20 per head for grade animals and \$50 per head for purebred animals. It is contemplated that about 1,300,000 disease-infected animals will be eliminated over a period of 18 months. This program has already been put into operation, and will be stressed when the current glut of cattle markets engendered by the movement of cattle from drought areas has subsided.

SUGAR

By means of legislation passed in May 1934, the administration developed a comprehensive sugar program which provided the mechanism for the solution of difficult problems arising in an important agricultural industry. The legislation embodied recommendations contained in a Presidential message to Congress dated February 8, 1934.

Sugar cane and sugar beets were made basic agricultural commodities under the Agricultural Adjustment Act and base quotas for continental beet and cane sugar were set forth. The Secretary of Agriculture was directed to ascertain the Nation's annual sugar requirements. He was empowered to allot quotas among the various insular and foreign sugar-producing areas; to establish marketing allotments for individual processors; to levy a processing tax on sugar; to include provisions governing labor conditions in sugar agreements; to purchase a substantial quantity of surplus beet sugar; and to enter into contracts with producers for acreage control.

Broadly speaking, the sugar program sought the following objectives:

(1) To retain sugar-cane and sugar-beet production in the United States at approximately the average level of recent years' production.

(2) To assure fair returns to the domestic producers by means of benefit payments made from processing tax funds.

(3) To stabilize sugar production in Puerto Rico, the Philippine Islands, the Territory of Hawaii, and the Virgin Islands at a level harmonious with consumption requirements of the United States and with the economic welfare of the various insular areas.

(4) To arrest the decline of the imports of Cuban sugar into the United States, so as to increase the Cuban market for American products.

(5) And, by reducing the duty on imported sugar, to prevent a rise in the price of sugar occasioned by the processing tax.

The Jones-Costigan amendment to the Agricultural Adjustment Act established a base quota of 1,550,000 short tons for continental beet sugar and 260,000 short tons for continental cane sugar. The legislation provided that the basis for determining the annual marketing quotas for the Territory of Hawaii, the Philippine Islands, the Virgin Islands, Puerto Rico, and for foreign countries should be the average quantities of sugar brought into the United States from the respective outlying areas for consumption in the three most representative years during the period 1925 to 1933. By proclamation of the President, taxes collected upon the domestic processing of sugar from the insular areas may be held as separate funds in the names of the respective areas, and are to be used for the benefit of agriculture through benefit payments for acreage reduction and for the expansion of markets and the removal of surpluses.

Comprehensive Program Authorized

In short, the act furnished the means for a comprehensive attack upon the problem of steadily increasing sugar production in the United States and insular regions, which occasioned a serious threat to prices and was primarily responsible for the substantial reduction in American exports to Cuba in recent years. The mechanism provided in the act was necessarily complicated by the fact that the United States depends on imports and receipts from the insular areas for about 75 percent of its sugar, so that virtually nothing could be accomplished through domestic adjustments unaccompanied by regulation of imports and adjustment of insular production.

Action to apply the various provisions of the act went forward immediately after its enactment on May 9, 1934. A processing tax was levied on sugar of 0.5 cent per pound, raw value. Simultaneously, the tariff on sugar was reduced by an amount equal to the processing tax. By this means the administration obtains its funds for carrying out the programs for the benefit of producers without placing an additional burden on the consumer. To prevent the accumulation of surplus stocks of sirup, of cane juice, and edible molasses, and depression of the farmer's price for cane, the administration levied a processing tax on these commodities of 0.125 cent per pound of total sugar content, as compared with the tax of 0.5 cent per pound on sugar.

The sugar consumption requirements of the continental United States were established at 6,476,000 short tons, raw value, for the calendar year 1934, and quota regulations were issued accordingly. The marketing quota for United States beet sugar was 1,556,166 short tons and for cane sugar 261,034 short tons. The quotas for

Cuba and the insular areas were: Cuba, 1,901,752.14 short tons, raw value; Philippine Islands, 1,016,185.68; Puerto Rico, 802,842.20; Territory of Hawaii, 916,550.16; and the Virgin Islands, 5,469.81. For foreign countries other than Cuba, a reserve of 17,000 short tons was set aside to be allotted subsequently. Quotas of refined sugar were also established as part of the total quotas, as required by the act.

On the whole positive and effective steps have been taken to stabilize the continental and insular sugar industries. At the same time adequate imports of sugar have been provided to preserve substantial foreign purchasing power for American agricultural and other products. The insular possessions will receive compensation out of the proceeds of the domestic processing tax placed upon their sugars. Processing-tax funds will provide annually up to \$10,000,000 for disbursements in the Philippine Islands in the furtherance of agricultural benefit programs; \$9,000,000 for the Hawaiian Islands; \$8,000,000 for Puerto Rico; and \$50,000 for the Virgin Islands.

Adjustment in the United States

In the United States a program has been launched for the adjustment of sugar-beet and sugar-cane acreage. Separate adjustment contracts have been drawn up for sugar-beet and sugar-cane growers. The contracts provide for adjustments of production, though not necessarily reductions, for the crop years 1935 and 1936, and for benefit payments for 1934, 1935, and 1936. The administration expects to make the first payment to cooperating growers before January 1, 1935, and another payment on the 1934 crop in the spring of 1935. It is estimated that these payments, the first of which will exceed \$8,000,000 and the second of which will be approximately \$4,000,000, will increase the average income of producers by more than \$100. The provisions of the adjustment contracts are drawn so as to permit the application of the benefit payments as partial crop insurance.

RICE

In dealing with rice, a basic commodity under the Agricultural Adjustment Act, the administration moved to raise the income of the growers through marketing agreements rather than through a combination of processing taxes and benefit payments. It adopted this method because the rice industry is comparatively small and geographically compact, and because the rice growers have had considerable experience in cooperation. The administration negotiated agreements with the California rice industry and with the southern rice industry whereby the mills agreed to minimum prices and conversion charges and the growers undertook to control their production through acreage allotments.

The rice acreage of the United States nearly doubled during the World War. In 1920 it was 1,299,000 acres, as compared with 694,000 acres in 1914. Moreover, yields per acre increased gradually. As a result the production exceeded domestic requirements and put the American rice industry definitely on an export basis. In the

1921-22 season our rice exports amounted to nearly 20,000,000 bushels, as compared with only 3,000,000 bushels in the 1914-15 season. Subsequently the export movement declined, but it remained substantial. From 1926-27 through 1930-31 the annual rice exports ranged from 10,000,000 to more than 14,000,000 bushels. A material reduction in the rice acreage after 1930 did not take the industry off an export basis. The exports totaled 6,400,000 bushels in 1932-33 and the rice imports were very small.

This continuance of our rice industry on an export basis did not signify that an adequate export demand existed. On the contrary, the opportunity to sell rice profitably abroad steadily declined. Other countries assisted their producers with bounties and other forms of direct aid. Moreover, rice-importing countries were unable, owing to the depression, to purchase their normal quotas. Meantime the United States produced large crops. In 1930 and 1931 yields above normal on an unusually large acreage resulted in two crops of nearly 45,000,000 bushels each.

As a consequence of the reduced export demand and of our increased production, the domestic rice carry-over increased from 81,000,000 pounds in 1930 to 220,000,000 pounds in 1932. Though the carry-over declined in 1933 to 148,000,000 pounds, it remained the second largest on record, and prices dropped to a very low point. Rough-rice prices, which during the period 1921-29 averaged about \$1.10 a bushel, fell to 78 cents a bushel for the 1930 season, to 48 cents for the 1931 season, and to 42 cents for the 1932 season. In short, the position of the rice industry was identical in principle with that of the wheat industry, the cotton industry, the tobacco industry, and the hog industry. Burdened with excessive production for export, it could not get remunerative prices even for rice domestically sold.

Agreement Included Crop Control

Accordingly, on September 25, 1933, the Agricultural Adjustment Administration approved an agreement, which included a crop-control program for 1934-35, for the California rice industry. Later an agreement and license for the southern rice-milling industry became effective. In 1934 the southern agreement was revised to include a crop-control program. Parties to the California agreement are the Secretary of Agriculture, the rice millers of California, the Rice Growers' Association of California, and the independent rice growers' committee. Parties to the southern agreement are the Secretary of Agriculture and the rice millers of Arkansas, Louisiana, Texas, and Tennessee. As subsequently revised, the southern plan provided acreage allotments for individual growers. In both the California and the southern regions the production-control plan allots acreage among growers on the basis of their past production and gives an advantage in returns to the growers who cooperate.

In order to give the cooperating growers an advantage over non-cooperators, the California mills pay 60 percent of the agreed price when growers deliver rice. The balance goes into a growers' trust fund. Cooperating growers share in the final distribution of the trust fund according to their production units, which are based on their past history. Noncooperating growers receive no share in the trust fund. Of the total rice acreage planted in California, approxi-

mately 93 percent is within the scheme. Southern growers who made application for production quotas will receive full payment of the price established by the marketing agreement for all rice sold up to the amount of their quotas. Signatory millers purchasing nonquota and overquota rice have agreed to pay the producer 60 percent of the price set in the marketing agreement and to pay the remainder in to a trust fund held for distribution by the Secretary. It is estimated that over 95 percent of the southern growers applied for quotas.

Object of Program Achieved

The control programs were undertaken largely to prevent an increase in rice acreage, and accomplished that purpose. The total rice acreage this year was 737,000 acres, according to the July 1 estimate, as compared to 769,000 acres last year. The September 1 estimate of production was about 36.5 million bushels, slightly more than that of 1933. Growers benefited from the marketing agreements in selling their 1933-34 crop. The average farm price for all grades and varieties of that crop was 76 cents a bushel, or nearly twice the average price received for the 1932-33 crop. The total carry-over in first and second hands on August 1, 1934, was considerably greater than that of a year ago, but stocks in wholesalers' and dealers' hands were unusually light. The Federal Surplus Relief Corporation purchased 50,000 pockets of rice, and as a result the net carry-over in commercial hands will be about the same as last year.

TOBACCO

Considerable progress was made during the year in adjusting the supply of the various kinds of tobacco to the demand and in improving the income of tobacco growers. Approximately 275,000 growers in the United States and 10,500 in Puerto Rico entered into adjustment contracts in 1934, under which production was reduced about 30 percent. The United States crop of approximately 1,000,000,000 pounds in 1934 is about as much below the level of world consumption of this tobacco as the 1933 crop was above that level.

Six marketing agreements were negotiated for the principal kinds of tobacco grown in the United States. Under these agreements domestic buyers agreed to pay higher prices for their purchases from the 1933 crop on the basis of reductions to be made in the 1934 crop. The quantity of tobacco purchased under these agreements aggregated 633,000,000 pounds, which was nearly half the total production in 1933. It is estimated that the tobacco program increased the market receipts from the 1933 crop by approximately \$50,000,000 above what they would otherwise have been. In addition \$28,000,000 was paid to tobacco growers in the form of rental and benefit payments.

Altogether growers received approximately \$207,000,000 from tobacco during the current marketing year, compared with \$107,000,000 during the preceding marketing year. This total income is close to what tobacco growers received for their 1930 crop, and is only slightly below the average for the last 10 years. Prices of

tobacco in Puerto Rico increased about 40 percent after the adjustment program was started.

At the beginning of the marketing year for the 1933 crop there was in the United States a surplus of 900,000,000 pounds of all types of tobacco above the carry-over which would be considered normal for the rate of consumption then prevailing. The production-adjustment programs were undertaken to relieve the market of this surplus. Extreme differences in the conditions of production, market outlets, and prices, and the highly specialized nature of the problems involved, necessitated separate contracts for 11 different kinds of tobacco.

Effect of Monetary Policy

The increase in the price of gold during the past year from \$20.67 to \$35 an ounce had a stimulating influence on our export trade in tobacco, because of the increased purchasing power of foreign currency in relation to the American dollar. Tobacco exports from the United States during the year ended June 30, 1934, were 456,000,000 pounds, compared with 379,000,000 pounds a year earlier and 413,000,000 pounds 2 years earlier. Some increase of sales was obtained through exchanges with countries that export wines and liquors to the United States. Additional outlets may be found in negotiations conducted under the new Reciprocal Tariff Act, though progress will inevitably be slow.

The results accomplished by the adjustment programs demonstrate the importance of controlling the production of tobacco. From 1923 to 1932 the grower's share of the consumer's tobacco dollar declined from slightly more than 12 cents to 4½ cents. Meantime the share received by tobacco manufacturers in the form of profits increased from 5½ cents to more than 10 cents. In 1933 tobacco growers received approximately 10 cents of each dollar paid by consumers for tobacco products and manufacturers received about 7 cents.

The consumption of tobacco products is relatively more stable than the consumption of most other farm products. In 1923 the total world consumption of United States tobacco was approximately 1,225,000,000 pounds (farmers' sales weight), of which 725,000,000 pounds were used in the United States and 500,000,000 pounds in foreign countries. Total consumption gradually increased both in the United States and in foreign countries until 1929, when it was about 1,400,000,000 pounds. Consumption of all United States types of tobacco declined from 1929 to 1932, and during the latter year was only 1,225,000,000 pounds, or back to where it was 10 years earlier, both in the United States and foreign countries. In 1933 the world consumption of our tobacco showed a small increase.

Flexibility in Contracts

Flexibility in the adjustment contracts has been an essential factor in facilitating the control of tobacco production. The acreage and production of tobacco on individual farms vary widely from year to year; hence in drawing up the various contracts it was advisable to give producers operating under different circumstances several choices as to the year or years used in establishing their base. After

the sign-up campaign for some of the kinds of tobacco was under way, it became evident that additional choices of base would be required to make it possible for some growers to obtain equitable allotments, and additional choices were provided.

A unique feature of the tobacco contracts is that, with the exception of cigar leaf tobacco, they all provide for definite allotments of production on individual farms as well as acreage allotments. With specific allotments of production, such as those provided under the tobacco contracts, it is possible to determine more definitely the exact size of crop which is likely to be produced and to make adjustments in the quantity to be marketed. Under these contracts adjustments of production allotments may be made after the crop has been planted and before selling time, on the basis of current prospects for production and demand. The contracts for cigar leaf tobacco were offered growers for the 1933 crop during the planting season, and consequently there was but little opportunity for growers to increase the yield per acre of that crop. The 1933 plan for the cigar leaf tobacco is being continued in 1934, which offers an opportunity for determining the relative merits of the different types of contracts for tobacco.

Growers who participate in the tobacco programs receive two classes of payments. The first payment is made in the form of a "rental", and is at a uniform rate per acre for each kind of tobacco upon the number of acres taken out of tobacco production, regardless of productivity. The second payment—and the third payment, in cases where a third payment is provided—are based upon the net sale value of the tobacco grown on the farm. In this way the payment reflects the yield and quality of the crop produced, and thus more nearly compensates each producer in accordance with the opportunity he has given up because of participating in the adjustment program. This method of determining payments was found to be advisable in the case of tobacco, owing to the extreme variations in yields and prices of tobacco on different farms.

Approximately one-third or more of the total payments made under most of the tobacco contracts are rental payments, which are made regardless of production in the current crop. In the case of other payments, minimum rates are provided for in each contract, and growers are guaranteed at least these minimum payments, regardless of the volume of their production. In some of the contracts the minimum rates are stated in terms of a specified number of dollars per acre of the rental acreage. In others, provision is made for a deficiency payment to be made on each pound that the grower's production may fall below his allotment. Insurance against a partial or total crop failure is thus provided.

Kerr-Smith Tobacco Act

The Kerr-Smith Tobacco Act, approved June 28, 1934, was passed by Congress in response to requests of a large number of tobacco growers, as a supplement to the tobacco programs inaugurated under the Agricultural Adjustment Act. It provides for the levying of a tax of 33½ percent upon the sale price of all tobacco of any type covered by a production-adjustment program, except during 1934–35

the tax shall not be applied to Maryland, Virginia sun-cured, and cigar leaf tobacco. The act further provides that if it is determined that a lower rate of tax would best effectuate its declared policy, the rate may be not less than 25 percent. For the crop year 1934-35, the rate of the tax has been established at 25 percent. The tax may be levied upon tobacco harvested during the crop year 1935-36 of any type covered by a production-adjustment program, provided three-fourths of the growers of that type favor the levy.

The act provides for the issuance of tax-payment warrants to all producers operating under a production-adjustment contract, and for the issuance of such warrants to noncontracting growers in each county up to an amount of tobacco equal to 6 percent of the number of pounds covered by warrants issued to contracting producers. Tobacco growers who did not sign adjustment contracts prior to the passage of the Tobacco Act were given 30 days from the date on which it was approved, June 28, 1934, during which to sign such contracts. All contracts signed during this 30-day extension period provide the same benefits and require the same performance as those entered into during the regular sign-up campaign.

With the very large sign-up that has been obtained under the tobacco contracts, and with the provision for issuing additional tax-payment warrants to noncontracting growers, it is believed that only a very limited number of growers will be required to pay the tax upon tobacco harvested in 1934.

UNEMPLOYMENT AND SUBSISTENCE FARMING

It is impossible to consider only the farmers in promoting farm recovery. Crop adjustments affect nonagricultural interests profoundly. They affect the price and the volume of the farm output, and thus influence both the cost of living and the employment that depends on the handling of agricultural goods. Moreover, by limiting farm production, the crop adjustments tend, though not in any serious degree, to create rural unemployment. Whatever restrains production reduces the need for man power. The Nation's farm program therefore creates certain responsibilities toward nonfarmers. This fact the Agricultural Adjustment Act recognizes in its declaration of policy, which lays down a course of action conceived in the national interest rather than in the interest exclusively of the farmers. It calls upon the community as a whole to do some things for agriculture, on the assumption that the resulting benefit will be shared nationally. The idea, in short, is that farm relief will prove to be national relief.

In certain respects the implied obligation to aid agriculture only in ways consistent with the general interests creates no difficulty. Action taken to raise farm prices adds something to the cost of living, but provides compensation by improving the rural market for city products. It creates the urban purchasing power needed to absorb the costs. Consumers do not find the higher prices burdensome because the increased farm income flows into the channels of trade. There is a quickening of our whole economic life. In other respects, however, the problem is more complicated. Particularly is this the

case in connection with unemployment, upon which as already noted the crop adjustments have a definite bearing.

In hard times the unemployed look naturally to the land. They cannot be refused access to it; and yet to admit them into agriculture unconditionally would involve removing certain restraints upon agricultural production. Here is a dilemma. On the one hand, the progress of agriculture absolutely requires a limitation of farm production and therefore of farm employment. On the other hand, national expediency forbids closing the rural country to the urban unemployed.

Crop Controls Cause Little Unemployment

The Agricultural Adjustment Act creates very little unemployment. Farm owners, and tenants with a reasonably secure tenure, do not become unemployed through crop reductions. Hired labor and certain types of tenants, notably the share-croppers of the South, may occasionally suffer. But the Agricultural Adjustment Administration endeavors to protect these groups. In cotton and tobacco contracts it stipulates that landlords as far as possible shall maintain their normal force of tenants or hired hands. By comparison with other causes of rural unemployment, such as the interruption of the flow of rural population to the towns and the flight of city people to the country, the influence of crop adjustments is negligible. Between 1929 and 1933 nearly 2,000,000 people left the towns.

Six Southern States last spring reported having on their relief rolls from 15,000 to 40,000 farm families per State. For the most part, however, these farm families had been thrown into distress by the depression. Undoubtedly the number would have been greater had the adjustment program not increased the income from cotton in 1933. Moreover, the great majority, perhaps 75 percent, were still on farms in one capacity or another. They were not entirely without means of self-support. Considering the country as a whole, the crop adjustments relieve far more unemployment than they create. Scores of towns and cities throughout the country, which 18 months ago were in the depths of depression, have picked up under the influence of restored farm buying.

It is nevertheless true that farm recovery, with its need for restraints on farm production, goes against the natural desire of the urban unemployed to seek refuge on the land. In this matter the agricultural interest—the necessity for farmers to curb their competition—must to some extent give way. There are many millions of unemployed in the United States. Their maintenance is a public charge, which cannot be repudiated. About one-third of the families on relief rolls are already in the country or in country towns. Moving an increased proportion from the congested centers of population doubtless would reduce in many cases the expense of maintaining them. Living costs are much lower in the rural communities, and the country affords a chance for the unemployed to produce some of their own food. To some extent the shift is necessary.

A Counterweight to Farm Recovery

Such a shift tends to deprive commercial farmers of a part of their urban market. Moreover, it tends to increase farm competition. So-called "subsistence farming" cannot be entirely noncommercial. Inevitably it produces something for sale. This is a counterweight to farm recovery which farmers will cheerfully accept in an emergency. But they have a right to urge that its effects be tempered as much as possible. We ought not to adopt a defeatist attitude, and to say the only thing to do with urban unemployment is to push it into the country. That simply means dividing a reduced agricultural income among an increased number of persons. It is far better to push industrial recovery. Meantime, we must handle the situation with the least injury to established agriculture.

Subsistence farming has been suggested as a solution—i. e., farming not for the market but for the home table. This is a difficult aim. Farm families require a cash income to supplement what they can grow for their own use. Unless they can earn money off the farm, they must get it from the farm. Otherwise the subsistence farm does not furnish subsistence.

Established farmers have a right to insist that nonfarm sources of cash income be made available when the country establishes unemployed people on the land. Placing thousands of families on the land, with no other source of income, drives them into commercial farming. They may not produce any great quantity of goods for sale, but what they do produce will be sold at distress prices. Such fostered marginal production can do great harm. So far the movement to put city people on the land has run ahead of the provision for supplementary employment. People have been decentralized faster than industry, and established farming suffers. Part-time nonfarm work must go along with so-called "subsistence farming."

The task is full of difficulties, which must nevertheless be faced. Centralized industry grew up in its present locations in the pursuit of profit. To decentralize it, not primarily for the sake of profit but in order to furnish employment in new locations, should not be attempted hastily. In thus trying to improve the conditions of employment, the profit motive cannot safely be ignored. To do so may do more harm than good. Redistributing labor and industry over the countryside is a delicate operation. Yet not to try it means destroying the essence of the subsistence-farming movement, and turning it into an unregulated and uneconomic eruption of city people into commercial agriculture. Countryward movements of the unemployed should be accompanied by a sufficient expansion of local non-agricultural employment to provide a local interchange of factory and other goods for farm products. To expand farm production for local consumption, without at the same time expanding industrial production for local consumption, would simply displace farm products from other regions. It would aggravate the unbalanced condition of agriculture, and would not work any net improvement.

Nature of the Problem Recognized

Relief agencies, both Federal and State, have this well in mind. In one State 49 percent of the unemployment-relief load is rural and

51 percent urban. The State relief agency will have urban-relief groups produce industrial goods, while rural-relief families produce food. Both types of production will be held within relief channels, and a system of exchange will give each person credit for his own production. This method should have wide application, since it furnishes unemployment relief at relatively low cost without seriously complicating farm readjustment. Another State has plans under consideration for establishing manufacturing or processing plants in country communities to furnish part-time employment. These establishments, it is believed, will provide a source of cash income both to urban-relief families newly moved into the areas served and to rural-relief families already there. In yet another State the relief authorities contemplate relocating good families whose adult members were farm-reared. Many such people wish to return to their old neighborhoods but not necessarily to resume farming.

Fundamentally, the question is whether poor folk in town and country should be supported in demoralizing idleness or helped to become self-supporting. Either method involves expense to the rest of the community. Which is the less costly, everything considered? Short-sighted views may prefer straight charity to obviate increasing the intensity of industrial or agricultural competition. But that involves attaching value to work for its own sake, without regard to the destination of the product. It means that the employed elect to work harder, so that the unemployed need not work at all. The other method, whereby urban and rural relief families employ one another through an exchange of services cuts down the relief bill, may have little harmful effect on commercial industry and agriculture and prevents social disaffection. There is nothing wrong with the idea. The danger is that we may not apply it thoroughly; that in practice we may not couple subsistence farming with adequate part-time employment.

Establishment of Subsistence Homesteads

The Division of Subsistence Homesteads of the Department of the Interior is promoting the true objective. Section 208 of the National Industrial Recovery Act appropriated \$25,000,000 to be used to "aid in the redistribution of the overbalance of population in industrial centers" through assisting in the establishment of subsistence homesteads. Before the close of the fiscal year the Department of the Interior had approved plans for 58 projects, the majority of which are now under way. In each project there are from 25 to 300 homesteads.

Specifically the aim is to help poor families to get a more secure and more satisfactory living through a part-time combination of industrial employment and subsistence agriculture. The homesteads are usually 1 to 5 acres in size. They are capable of producing a large portion of a family's yearly food supply. The cultivation of vegetables, fruits, truck crops, and the care of poultry, and in many cases a cow, comprise the agricultural operations on most subsistence homesteads.

Because the subsistence-homestead plan is a method of aiding in the solution of various social problems, rather than an object in

itself, the projects vary considerably. First, there are garden homesteads for industrial workers. Projects of this type are located near industrial towns and cities, where the workers, while living in semi-rural communities are yet able to commute easily to and from their urban jobs. Such projects may tend somewhat to decentralize population and industry. In large urban areas, such as Los Angeles, Chicago, Youngstown, and Birmingham, the decentralizing trend develops within the urban districts through the establishment of suburban areas of subsistence-homestead communities. Small industrial towns, such as Decatur, Ind., Austin, Minn., Taylors, S. C., or Longview, Wash., offer good opportunities for subsistence homesteads under conditions favorable to industrial decentralization.

Projects for Stranded Industrial Groups

Then there are subsistence-homestead projects for stranded industrial groups. Great numbers of people formerly employed in the exploitation of natural resources have permanently lost their jobs through the exhaustion of the resources, as, for example, in certain abandoned coal fields of West Virginia. With the home production of food and shelter on the subsistence homestead as a basis, and with recourse to part-time employment in forests, newly established industries, or handicrafts, many previously destitute families are becoming self-supporting.

Rural rehabilitation sometimes calls for applying the subsistence-homestead plan to agricultural groups. The submarginal areas of the old Cotton Belt, of the cut-over lands of the Lake States, and of certain dry-farming regions of the northwestern Great Plains have been chosen as demonstration sites. Thus farm families have a chance to move from eroded, worn-out, or drought-stricken sections to subsistence-homestead communities located on good land. Intensive farming, primarily for subsistence, replaces extensive and wasteful cash-crop production. The crops produced for the market are usually not the staples in which surpluses exist. Moreover, the establishment of these new farm homes is offset by the retirement from cultivation of proportional amounts of submarginal land.

LAND-UTILIZATION PROBLEMS

Farm-recovery measures applied up to the present have been of an emergency character. They have been drastic and temporary remedies, necessitated by a collapse in foreign and domestic markets, a tremendous accumulation of farm surpluses, and the virtual bankruptcy of agriculture. How long it may be necessary to continue these expedients with various modifications we cannot tell. Full recovery of the agricultural market may be long delayed. It is therefore necessary to transform the emergency program into a more permanent policy, whereby we may adjust production at the least cost, with the least disturbance to normal farming, and with the most encouragement to farm efficiency. We must move from emergency adjustments to long-time planning.

Essential to the welfare, not only of agriculture but of the Nation as a whole, is a better land-utilization policy. This involves systems

of land tenure as well as of land use. It is concerned with all the principal land uses, including farming, forestry, recreation, and wildlife conservation. In any sound national economy a rational land policy must be the cornerstone. In this country we have tried many other means; we have not yet tried that. On the contrary, we have retained as a heritage from our pioneer epoch a seriously defective land-use method. Accordingly the Department of Agriculture has established a land-policy section in the A. A. A. which is cooperating with the National Resources Board, the Federal Emergency Relief Administration, and various other Federal and State agencies. It is studying means whereby land that should not be in agriculture may be withdrawn from it, and whereby land properly in agriculture may be devoted to the right crops in the right proportions. This is a social as well as an economic problem. It involves human beings as well as land.

In cooperation with the Federal Emergency Relief Administration, the Department is trying to find new locations for farm families now living in areas naturally unsuited to farming, or untenable as a result of economic changes or of the depletion of soil, timber, or mineral resources. This is a task which must be advanced slowly. Public agencies may desirably purchase poor cultivated lands gradually, but to do so quickly would be nearly impossible. Such action would run into difficulties of negotiation, of title examination, and of survey. It would involve much risk of excessive speculation and possible fraud. Still more important, it would suddenly displace perhaps a million farm families, for whom other employment would be hard to find. Furthering the retreat of agriculture from unsuitable land is a long-time operation. It should not be regarded as a means of effecting production adjustments rapidly. This year the Government is developing plans to acquire submarginal lands in about 30 States; but the purchases in view will total not more than 4,000,000 acres, only about half a million acres of which will be cultivated land. These figures give some idea of the difficulties.

It is, of course, extremely desirable to promote the retirement of lean acres from cultivation. The problem of submarginal areas is partly a problem of local maladjustments. Attempts to cultivate barren acres mean a wastage of human efforts and of natural resources. Frequently the land would be much more valuable in forests, recreation areas, or wildlife refuges. Important advantages result from the regrouping of rural populations, so as to obviate unnecessary costs of local government in sparsely settled areas. Action should be taken to prevent the reoccupying of abandoned poor farms. Such steps promote the welfare of the people immediately concerned, and harmonize with our national crop-adjustment programs. Our present emergency adjustments apply to good land and poor land alike; to well-farmed and ill-farmed land. Frequently they necessitate the disuse or less effective use of buildings, implements, work stock, and labor. They may disturb the general farming plan and the rotation system, and complicate the relations of landlords and tenants. As rapidly as it can be developed, we should employ a more discriminating program, in which the permanent withdrawal of land unsuited to farming will play an important part.

Soil-Depleting Practices

As I mention elsewhere in this report, soil erosion in many parts of this country is undermining the foundation of economic and social life. But erosion is only one source of soil depletion—only one aspect of a process of soil mining which should be stopped. Through practices which became habitual in our pioneer period, and which continued throughout extensive areas, millions of acres have been ruined for cultivation. These areas in many cases may be restored to usefulness through reforestation or through their allocation to other nonfarm uses. A much larger area not yet abandoned is declining. Some of it was always submarginal. Much of it has become so. It should be acquired by public agencies which may find for it many profitable uses.

On much land that may continue in farms, permanent pasture and forage should be substituted for intensive crops, and systems of rotation should be introduced to check erosion and restore or maintain fertility. But to do this in many areas would reduce commercial production. Sometimes that would be entirely compatible with the farmer's immediate interest. Again it would not. Farmers, if left to themselves, would in many cases continue their soil-exhausting practices. As one remedy, the Department is studying the possibility of using crop-benefit payments to encourage types of farming adapted to soil conservation. It is examining the practicability of inducing farmers, through crop-adjustment contracts, to bring about collectively a more desirable allocation of the land in farms among different farm enterprises. It may eventually be possible for the Government to purchase easements which would give it the right to require certain practices tending to soil conservation. Other means may be developed gradually to replace the emergency crop adjustments with a long-time program to promote permanently efficient farming and social stability.

Farm holdings in many parts of the United States should be readjusted in size. In some areas they are too small and in others too large. Without Government initiative the necessary readjustment will not occur or will occur but slowly. Larger farming units in some regions will make possible a wider use of pasture and of soil-conserving crops. Credit policies could be shaped to promote the blocking up of small farms into larger units. It need scarcely be said that action to increase the size of farm holdings would have to be coupled with provisions for the relocation of many farm people, for obviously an increase in the average size of farm holdings may mean a decrease in the number of farm families. On the other hand, farm holdings are now too large in certain areas where creditor institutions and agencies have taken over considerable tracts without having the means to farm them well. Moreover, many plantation owners in the South can no longer operate their plantations by the old methods, which called for annual advances to croppers. In such areas public agencies might help to establish farming on a family basis. In some localities changes in the average size of farm holdings would involve a less intensive, and in other localities a more intensive, use of the land.

No Fixed Adjustment Possible

In all agricultural planning, emergency and long-time alike, we must seek a continuing and not a fixed adjustment. We cannot accurately forecast the effective demand for farm products a year ahead, to say nothing of 10 years or 20. General economic recovery at home and abroad would change the whole situation. Further economic difficulties would change it in the opposite direction. Neither crop adjustments nor land planning can insure a continuously stable balance. Flexibility in production and in land policy is the only means by which stability can even be approached. We cannot expect to eliminate the tendency for production in particular crops to get out of line with demand; nor can we plan the general size of the farm plant and the general distribution of farm enterprises for a long time ahead. Every period of good times creates new farms. With every prospect of better conditions, real-estate interests stimulate the demand for land and eager individuals push into new areas. It is neither possible nor desirable to put agriculture in a strait-jacket. Nevertheless, we should constantly strive to prevent known wrong uses of land. Mistaken expansion, once it has occurred, tends to persist. Better means of prevention are urgently necessary. Even the lands still owned by the Government are not guarded against unwise use.

By authorizing the Secretary of the Interior to permit homestead entry only on suitable lands, the Taylor bill, which passed Congress at the recent session, provides a partial means of preventing further unwise settlement of the public domain. It applies, however, only to about half the total area. The public should have a voice in determining whether privately owned land as well as Government-owned land should be settled, because settlement obliges State and local agencies to build schools and roads and to furnish other services. They should not be compelled to bear this heavy expense for sparse and scattered populations and perhaps for very transitory settlers. Public agencies must furnish relief from the effects of unwise settlement. They are spending millions already to correct bad effects of our homestead policy, persisted in after the lands for which it was adapted had been taken up. They are spending considerable sums to aid families in moving from land which should never have been farmed. In land-use planning, a first essential is to prevent the repetition of past mistakes.

Much may be done by the States to promote sound methods of land use. Zoning may help to prevent unsuitable or hazardous settlement. Eventually this principle may come to have an important place in rural land policy, just as it has already in urban land policy. Wisconsin has adopted zoning ordinances in some of its cut-over counties, and several other States have made a beginning in rural zoning, though mainly in suburban territory. States may find it desirable to adapt their grants-in-aid policies toward the same general end. By this means they might guard against some of the abuses that come from the occupancy of new areas by scattering settlers, while continuing to help the poorer districts in providing schools and other necessary facilities. In cooperation with the States, the Federal Government could outline areas unsuitable for settlement;

it might also shape credit, emergency-relief, and crop-benefit policies to discourage unwise settlement. It might acquire easements which would authorize it to prevent the settlement of areas not suited to farming. In our land system Federal and State policies must go hand in hand. Land policies frequently are local in activity and initiative, but they should be national in procedure and scope and should serve national as well as local ends.

It need scarcely be said that land planning involves questions concerning not only agricultural lands, but also lands adapted to other uses. Indeed, we cannot entirely separate the agricultural from the nonagricultural uses of land in a well-rounded program. The depletion of forests, minerals, and game resources causes both urban and rural harm. It affects employment in both town and country. Many rural communities depend greatly on part-time nonfarm work. Vast areas of nonagricultural land, for which we have at present no constructive use, might be made profitable through Federal and State cooperation in developing a unified land policy. Large tracts formerly in private ownership are tax delinquent. Much tax-delinquent land may not reenter private ownership quickly and perhaps should not. But before public agencies can find good uses for this land, State laws affecting tax delinquency need, in many cases, to be modified; and Federal and State policies need to be harmonized to promote the acquisition and use of such lands by public agencies.

Social Aspects of Land Use

Another vital aspect of the land program is the human aspect. As competition for land increases, two harmful results develop. Land-hungry folk take up areas that should not be farmed, and capital charges tend to become excessive on all farm land. In planning for the welfare of the rural population we must consider both the amount and the distribution of the farm earnings. On land unsuited to agriculture, neither science nor toil can make the return sufficient. Even on good land, farm earnings tend to be absorbed in capital charges and to be more or less diverted from the farm population. Our present agricultural policy seeks a remedy for this twofold evil. On the one hand it strives to direct agricultural enterprises to the right crops and their right lands. On the other hand, it seeks to obtain for the farm operator a larger reward for his labor and management. But farm income in times past has risen greatly without permanently safeguarding farm welfare. What we are doing now to increase farm earnings will not produce a better final result automatically.

The welfare of farm families depends greatly, in short, upon the conditions under which men work the land. Our system of unrestricted, private ownership developed in a reaction against the restraints of earlier tenure. It served the country well enough during the period of agricultural expansion into new areas. But we see now that it conferred the right not only to use but to abuse natural resources and to burden the land with excessive capital charges. Perhaps we have gone too far in allowing freedom in the transfer and use of land. Such freedom does not necessarily cause land to fall into the hands best able to use it. Individuals cannot always

follow their long-time interest, to say nothing of that of the community. In seeking his own gain the individual, with his personal one-lifetime view, may squander soil and soil fertility. He may mine the soil and devastate the forests. In taking steps to guard against such evils in the future, public agencies would protect not only the community but the individual farmer. Wastage of natural resources originates in self-interest, but does not in the long run promote it.

Unrestricted property rights do not necessarily insure the welfare even of farm owners. Complete license to buy and sell land, and to use it in any manner that seems desirable, ultimately burdens the farmer with heavy fixed charges. As farm earnings increase, land values rise. Farmers obligate themselves for more than the land can earn continuously. A severe price decline ruins them. On over-capitalized farms, even a small decrease in the income from products sold may bankrupt the farm operator; it will certainly make his farm ownership illusory. It will tend to separate the ownership from the operation of the land, and to degrade the economic status of the farm family.

Growth of Farm Tenancy

For proof we have only to glance at the recent growth of farm tenancy in the United States. Farm tenancy is not good or bad in itself. It has advantages or drawbacks, depending on the conditions under which it develops. Under favorable conditions it enables farm operators of limited capital to become farm owners. It is a stage in their progress toward financial independence. Under other conditions an increase in farm tenancy may signify that farmers are meeting with increasing difficulties in their struggle for land. The type of tenancy we have in many parts of this country cannot be generally approved. It involves short tenure and lack of care for the soil. In the prosperous period that preceded the first post-war depression, tenancy increased in some areas because rising farm valuations made it more profitable to rent than to buy land. In the post-war depressions, tenancy increased because farmers who had borrowed heavily to buy or to improve farms could not meet their obligations. They lost their ownership status and became tenants. Some growth of tenancy is inevitable, when growing populations compete for access to desirable land. But a great increase in tenancy, reflecting bad financial organization in agriculture, is another thing altogether.

From the standpoint of better land use and also of better rural welfare, we need to correct the unwholesome features of tenancy. These are the migratory habits it fosters, and the disregard of soil fertility and long-time farm efficiency. In this country the average occupancy of farm tenants is about 2 or 3 years as compared with the average owner occupancy of about 14 years. In certain other countries land occupancy continues in the same family for generations. This is true of tenant occupancy as well as of owner occupancy. Tenancy need not mean brief occupancy, with all its bad results. Many European countries have systems of land tenure which modify some of the socially undesirable features of unrestricted land ownership. In some countries the occupier has the right to use but not to sell the land, while restraints on inheritance prevent extreme and

uneconomical subdivision. Some countries require that land shall be efficiently used. It may not be practicable in the United States to adopt these principles, but less drastic changes merit consideration.

Possibilities of Improved Tenure Conditions

It should be possible to promote a more secure tenure, to discourage speculation and absentee ownership, to compensate tenants for unexhausted improvements, and to help deserving small farmers toward land ownership. Such reforms would increase the farm operator's income, without damage to property rights. They are more necessary now than ever before, owing to the prevalence of urban unemployment, which obliges more people to stay on the land. In order that they may do so without unduly increasing agricultural competition, and without paying exorbitantly for the privilege, the conditions of land tenure should be modified. It may be desirable to plan for a larger number of small semicommercial or partially self-sustaining farm families, and for some reduction in the number of large commercial farms. Ordinarily, an increase in the farm population increases both production and fixed charges. As a result, the income of farm operators declines. In the circumstances with which American agriculture must now deal, improved conditions of land tenure would afford a partial remedy.

TYPE-OF-FARMING STUDIES

In projects for using natural resources to better advantage, and for aiding farm families to move from unsuitable land and to relocate in areas better adapted to furnish a livelihood, the results of farm-management studies have great value. Investigators in the Department and in the State agencies began farm-management work years ago to help in solving individual farm problems. Eventually it may prove most useful in broad social applications.

In the pioneer period and for long afterward farmers relied on experimentation and experience in developing their farming systems. On the whole the method worked well, but it was costly. Those whom it failed did not complain because they had expected to take chances. But the problem is different when public agencies undertake to direct the use and settlement of land. This is a tremendous social responsibility. It involves risks which only scientific knowledge can minimize.

Failure would involve consequences proportionate to the scale of the operations, and failure would be certain if blind experimentation were the only guide. To prevent it we must have detailed knowledge of the physical and economic factors involved as they affect the well-being of actual and prospective farmers. Failure will discredit directed resettlement far more than it discredited the old free-for-all method under which people regarded heavy casualties as a matter of course. But the most important reason for studying the problem carefully is that without careful preliminary study it will be impossible to do a good job.

Farm-management knowledge, derived from systematic study of the economic and managerial experience and problems of actual

farmers, is a kind of generalized experience which may save thousands of persons from repeating the same individual mistakes. There are two general aspects of farm-management study, the results of both of which are useful in guiding social effort in resettlement of farms and other adjustment enterprises. The first is a broad study of agriculture and agricultural resources in their relation to the individual farmer's actual farming. This is usually termed type-of-farming research. The other is the more intensive study of the details of individual farm organization and operation, production costs, and farm practice.

The broader, or type-of-farming aspect of farm-management research had its beginning, so far as the United States Department of Agriculture is concerned, with the publication in 1923 of a bulletin by the late W. J. Spillman entitled "The Distribution of Types of Farming in the United States." Though at that time the author could not attempt any close localization of specific farming types, he showed the need to do so, and broke new ground by linking physical with economic considerations. Later investigators, encouraged by a popular response to Dr. Spillman's work, followed the line indicated to such good purpose that available type-of-farming data now delineate type-of-farming areas for the whole United States on a fairly localized basis. With material furnished by the 1930 census, Federal and State agencies pushed their studies further. They have detailed type-of-farming projects either completed or under way in more than 20 States.

Nature of the Study

Type-of-farming research, besides describing accurately what the farming is in each local area, involves a study of all of the things that influence agricultural development and that determine just how farmers farm in each area and under each specific set of conditions, economic and physical. It involves the classification of farm lands, the study of agricultural markets, and of industrial conditions and business trends. It is essentially a cause-and-effect analysis in which the causes are all the conditions and forces the farmer has to deal with, and the effect is the farming which results, together with the degree of its success or failure.

The other phase of farm-management research, equally important with type-of-farming studies in the guidance it furnishes for public efforts at improving the farmer's condition, is the study of the farm as an individual business and producing unit. In the beginning of farm-management research this was its entire scope. Through the examination of a limited number of farms, it tried to determine the essential elements of farm organization and operation leading to success. Its results had only limited application at first, because the study was not sufficiently localized and its sponsors tried to generalize too broadly from the limited conditions studied.

As such studies went forward, however, there was accumulated a vast amount of essential information contributing to the detailed understanding of farming costs, of the principles of organization and management, and of what is required to make a successful farm and to make good farming. Such understanding is indispensable in the great social task of guiding the adjustments in agriculture.

Trial and Error too Slow Just Now

Short cuts to new types of land use may not be necessary or even advisable in normal times. They are imperative just now. Trial and error are too slow. Although farm-management research tends in general to uphold prevailing farm practice, it also shows that agriculture generally lags in adjustment to changing physical or economic conditions. Delay is the rule; and delay is costly. Moreover, the more rapidly conditions change the greater is the lag in the readjustment. With readjustment going forward, so to speak, under forced draft, and yet failing to keep pace with the breakneck rapidity with which the agricultural situation changes, we must learn by realistic tests what types of farming and what systems of organization and operation seem to have the best chance in the new conditions. Research cannot eliminate risk or furnish absolute assurances of success. But it can furnish better guidance than can be had otherwise. It is a means of anticipating the lessons of individual experience.

THE SHIFT TOWARD GRASS AND FORAGE

Permanent farm recovery requires full use of the farm plant in ways that will not depress prices. Aid may come from two sources—from improvement in the demand, foreign and domestic; and from changes in the size of the agricultural plant or from a shift from such crops as corn and wheat to those like grass and forage. With the prospects of an improving demand, and with proposals to withdraw land from cultivation under adjustment contracts and through the diversion of submarginal areas to nonfarm purposes, I have dealt already. Neither from any quick improvement in the demand, nor from the withdrawal of land from agriculture, are we likely to reach quickly a point at which capacity production will be continuously profitable. Necessarily, therefore, we must consider a major shift from excess acreage of surplus crops back to the balanced condition between cultivated and grass acreages which existed before the war.

Reducing production by using land less intensively would promote efficiency; for efficiency is not synonymous with intensity in farming. Frequently, as both livestock men and field-crop growers well know, it does not pay to strive for maximum production per animal or per acre. There is a point beyond which further expense to increase output means waste. This point of diminishing returns exists for agriculture as a whole, as well as for the individual farmer. To plant high-yielding crops on every possible acre is seldom good business.

A general shift toward hay and pasture and toward soil-improving crops would have marked advantages for American agriculture just now. It would help to readjust the production of cash crops, and would at the same time reduce costs of production considering agriculture as a whole. Furthermore, it would help to prevent erosion. In other words, a broad movement toward the less intensive crops would tend to increase farm incomes now and to upbuild the agricultural plant.

Naturally, the plan cannot be put into effect to the same extent on every farm. Farmers with heavy fixed costs and with no chance to farm more acres as an offset to decreased production per acre, would have legitimate objections. Generally, however, the shift would reduce the pressure of supplies on the market, without throwing farm land totally out of use. It would advance the farm-readjustment program as a whole, with some advantage to every farmer. In order to square the general with the individual interest and to overcome difficulties on individual farms, it may be necessary to arrange for collective action under Federal guidance, in harmony with principles already familiar to the country through the A. A. A. adjustment programs. There is no reason why collective voluntary adjustment should not work as effectively in promoting a shift to grass and forage as it does in other directions.

Through benefit payments the Agricultural Adjustment Act has enabled many farmers already to increase their pasture and roughage. Further steps to that end would be facilitated should it prove practicable to place the adjustment contracts on a farm basis rather than on a commodity basis. Such a plan would apply the processing-tax and benefit-payment system to the general task of getting land from cultivated crops into grass and forage, and of encouraging a shift toward a less intensive type of farming. By this means the total farm output would be held more nearly in line with the demand year after year, prices would be increased, and operating efficiency would be maintained. Making agriculture less intensive would benefit directly such major cash crops as wheat, cotton, and tobacco, and would benefit livestock and livestock products indirectly. An average acre of hay or pasture will produce only about half as much feed as an average acre of grain; but since the unit is lower, a double advantage results. Prices go up and the expenses of production go down.

A Rapid Shift Impracticable

Such a shift cannot be accomplished quickly. It involves complicated adjustments in crops and in farm organization and management. In the Northeast much of the farm land is already in hay or pasture. In the Corn Belt there is more room for the shift. Farmers there have a wide range of crops from which to choose. For permanent pasture they can use Kentucky and Canadian bluegrasses, alfalfa, and mixtures of bluegrass and such grasses as redtop, orchard grass, meadow fescue, and ryegrass. For temporary pasture they can sow Sudan grass, rye, soybeans, oats, vetch, timothy, and the clovers. Such crops as sweetclover and soybeans can be used for soil improvement. In the South the chief need is for soil-improving and erosion-preventing crops.

In the wheat-producing areas on the western edge of the Great Plains the problem is more difficult. Some of the land there can be put into Sudan grass, some into crested wheatgrass, and some into sorghums for forage. Some land can be summer-fallowed. For the most part, however, acreage retired from cultivated crops in this region should, if possible, be allowed to revert to permanent pasture. In the Palouse area of the Pacific Northwest, the hilltop land, the fertility of which has been much depleted, should be removed from cultivation and planted to grass. Such a procedure would help to

control erosion, as, indeed, the increased use of grass and forage would in most areas. Recent surveys indicate that approximately 35 million acres of formerly cultivated crop land, most of which was once very fertile, have been forced out of cultivation by erosion. From an additional area four times as large the top soil has largely disappeared. A grass cover is an economical and permanent cure for soil erosion.

In 1934 the drought and also a seed shortage prevented rapid pasture development. It would be impossible in any event, however, to do the job in a single season. This Department, in cooperation with State agricultural agencies, is conducting experiments to determine the cost of establishing pastures, and the value of hay and pasture in producing milk and meat. It has published a pasture handbook. It is also studying how to reconcile individual and group interests. Unless the shift from cash- and feed-grain production to soil-improving crops and to hay and pasture can be made profitable for the individual farmer, it will not be made. An obstacle in the past has been the desire of competitive farmers to produce as much as possible, in order to maintain their income. As a result, the individual interest clashed with the group interest. To remove this clash is the special task of the A. A. A. A considerable proportion of the land taken out of cotton and tobacco went into forage crops and feed for home use. Much of the land taken out of wheat and corn this year went into hay, pasture, and forage. These facts indicate that the difficulty can be overcome.

Livestock Aspects of the Problem

Livestock aspects of the problem are not particularly formidable. Farmers have already reduced their hog production, and the purchase of drought-stricken beef cattle by the Government helps to adjust cattle production. A beef-cattle adjustment of broader scope is under consideration. Dairy production can be adjusted rather quickly to less intensive feeding, and poultry production likewise. It is, of course, wrong to suppose, as many nonfarmers do, that a shift from cultivated crops to grass and forage would increase the production of livestock and livestock products. True, pasture and roughage maintain animals exclusively, whereas cultivated crops produce human foods and textiles. But about 70 percent of our cultivated acreage produces livestock feed. Turning cultivated acreage over to grass and legumes would therefore reduce the total amount of animal sustenance available.

In 1919 the area used for pasture in the United States, excluding crop land pastured part of the year, was about 1,055,000,000 acres. This was 55 percent of the country's total land area. It was more than four times the area of crops used for feeding livestock. Nevertheless, the contribution of pastures to the sustenance of livestock was slightly less than the contribution of the crop land. There has not since been much change in the proportion of pasture to crop land, taking the country as a whole. But more than half the pasture is arid grassland and desert shrub land too dry for crop production. More than one-fifth is forest and cut-over land, the use of which for pasture is usually less important than its use for the production of wood. It is not in such areas that the big opportunity exists to

improve the farm situation by growing more grass and forage, but on the improved land—on the land in farms. Many farmers in all parts of the country could advantageously keep more of their land in permanent grass and legumes. They could increase the advantage by good care of pastures and by producing good quality roughage. This change will come about spontaneously to some extent. It is taking place already. Recognition of its economic soundness, possibly coupled with Government action to smooth out discrepancies between individual interest and collective interest, should forward it greatly.

More Grass Would Lessen Drudgery

There is another reason for the shift which should not be undervalued. Grassland farming takes less work than high-pressure plowland farming. Generally speaking, it provides a pleasanter farm life, with lower operating costs, less man-killing and woman-killing drudgery, and more leisure. This is as sound a business reason for the change as any of the cost-saving, price-raising features. Hustling used to be a part of the farm creed, but it can be overdone. To spare the farmer's labor, when to use it at the full means overproduction and low prices, is the most obvious common sense. In short, the considerations which make desirable a larger place for grass and forage in the farm economy touch the human as well as the monetary aspect of farming.

WILDLIFE CONSERVATION

The land-utilization program affords a long-awaited opportunity to restore and increase valuable forms of American wildlife through the establishment of an extensive system of waterfowl refuges and the improvement of environmental conditions for the birds. Millions of acres of land and water that originally produced an abundance of game, fur bearers, and fish were destroyed, so far as these resources were concerned, when subjected to unsuccessful agricultural operations. This factor has been one of the most important of all the causes that have contributed to the rapid decrease of wildlife during the past half century. The restoration of these tracts to productiveness in terms of forests and wildlife is a principal and worthy objective of the land-utilization program.

Under the restoration plan, \$8,500,000 of emergency funds has been set aside for use by the Bureau of Biological Survey for the acquisition, development, and administration of wildlife refuges. Surveys have been completed or are under way on such tracts as are situated along the principal flight lanes of the migratory wild fowl. Acquisition has already begun. Areas acquired or in process of acquisition on August 6, 1934, include the following:

	<i>Approximate acreage</i>		<i>Approximate acreage</i>
Lake Mattamuskeet, N. C.	50, 000	James River, N. Dak.	70, 000
Beltsville, Md.	800	Lake Andes, S. Dak.	16, 000
Mud Lake, Minn.	50, 000	Medicine Lake, Mont.	15, 000
Union Slough, Iowa	5, 000	Turnbull Slough, Wash.	5, 000
Wingo Swamp, Mo.	15, 000	Lake Malheur, Oreg.	80, 000
White River, Ark.	49, 000	Spalding Ranch, Calif.	15, 000
Des Lacs, N. Dak.	75, 000	Upper Mississippi River Wild-	
Mouse River, N. Dak.	80, 000	life Refuge	1, 000

These lands will be set aside as inviolate sanctuaries for migratory game birds. Because of their situation and character, the most valuable crop that they can produce is wildlife, and the areas will be managed for this specific purpose. Their usefulness will not be limited, however, to their effectiveness in increasing the supply of game, birds, fur bearers, and fishes, but will be reflected in benefits to agriculture and forestry and to human health and safety. The conditions most favorable to wildlife are identical with those that reduce erosion and promote flood control and soil improvement by the conservation of water resources and the production of heavy growths of vegetation for food and cover. The development of the refuge system will include the retention of higher water levels by the construction of small dams and dikes and the flooding of dry lands by diversion, employing inexpensive methods of construction. Pollution of water sources within these areas will be eliminated, and adequate fireguards will be furnished.

Scope of Wildlife Conservation

The development of wildlife as a national resource in connection with a general land-utilization plan should embrace not only national-forest, national-park, Indian-reservation, and State lands but should extend to parts of the unallotted public domain. A comprehensive system of Federal wildlife refuges contemplates including areas on the public domain that under proper administration would have a higher value for such game as mountain sheep, antelope, mule deer, and sage hens than for any other land use. On other parts of the public domain the plan contemplates control of the grazing of domestic stock, with due regard for the reasonable needs of the native species of game.

One million dollars from emergency relief funds has been set aside by Executive order for the acquisition of migratory wild-fowl refuges. One and one-half million dollars of the funds provided for the withdrawal of submarginal lands will be devoted to the acquisition of tracts peculiarly suitable for the production of waterfowl, fishes, and fur-bearing animals. Other submarginal tracts which, while not so well adapted to aquatic life, can be developed to meet the vital requirements of upland game species will be purchased direct by the Submarginal Land Committee and turned over to the State conservation agencies for administration as wildlife sanctuaries or demonstration areas. Three and one-half million dollars of drought relief funds will be used to purchase lands adaptable for wildlife sanctuaries within the drought regions and 2½ million dollars of Public Works funds will be available for engineering operations to restore and control water levels, to stop soil erosion, and to improve food and other environmental conditions on Federal wildlife refuges.

On March 16, 1934, the President approved the Migratory Bird Hunting Stamp Act, which provides for the issuance through post offices of a Federal hunting stamp at a fee of \$1. The stamp must be in the possession of every person over 16 years of age who hunts ducks, geese, or brant. It is estimated that the annual revenue from the sale of these stamps will be between \$600,000 and \$1,000,000, of

which 90 percent will be expended by the Biological Survey in the acquisition, improvement, and maintenance of sanctuaries for migratory waterfowl.

SOCIAL AND ECONOMIC ASPECTS OF FORESTRY

We solve only half the recovery problem when we stop producing surpluses. It is equally important to start producing something else. Curtailing production in certain lines without increasing it in others simply means creating more unemployment. There must be positive as well as negative readjustments; new jobs must replace old. Undoubtedly our greatest single opportunity to accomplish this end lies in forest improvement and conservation, through which we may furnish noncompetitive employment and permanent new sources of income. For much of our land forestry and agriculture are alternative uses. Fully one-third of the land in the continental United States is actual or potential forest land. There is no surplus of growing trees, but, on the contrary, an increasing need to guard against a future shortage. Forest industries can be developed to support many more people than they do at present without the slightest risk of glutting the market. Indeed, an increase in the forest uses at the expense of the agricultural uses of land would tend strongly to improve the general economic balance.

Accordingly the Department, through its Forest Service, is giving greatly increased attention to the protection, the development, and the permanent upbuilding of our forests. It is accelerating the program, not only to furnish noncompetitive employment on the land and to lighten the burden of relief but to put our timber on a sustained-yield basis—to get it handled as a crop and not as a deposit of ore. In this great enterprise three requirements stand out: (1) The acquisition of forest land by public agencies; (2) the restoration of this land to profitable timber production through fire prevention, replanting, and judicious cutting; and (3) extension of adequate fire protection to a larger proportion of private lands with recognition of the fact that private owners should cease “butchering” the timber, and should make provisions for future crops as they cut. In all three directions progress can be reported. Land acquisition by public agencies has been speeded, forest improvement has been forwarded through a public-works program, and forest industries under N. R. A. codes have assumed definite responsibilities for maintaining the productivity of timberlands.

As is well known, the Forest Service has battled for many years against short-sighted practices in the timber industry. This country's timber industry began with enormous raw resources—with virgin stands of timber against which no one had any charges. It strove to get out the timber as quickly as possible, and never thought of restoring the growth. Founded and financed on this basis, the industry counted on a short mill life, and on quick liquidation of its investment. In all parts of the country we can see the results in sawdust piles and abandoned towns. Many forest communities that seem still to thrive are nearing the junk heap; they are taking out forest wealth much faster than it can be replaced. If they keep up their present rate of cutting, they will

be finished within a few years. In an extensive western area that had 25 sawmills a quarter of a century ago, only 4 remain. There has been an enormous shrinkage in the timber crop. It is the same in the South. In one area typical of many, timber companies removed all the virgin timber, without leaving even seed trees. Fire caused more destruction. Now the mills are gone, the county bonds are in default, and half the population is on relief.

Difficulty of Reform

Against such practices it is difficult to make headway, though the forest industries themselves recognize the need of reform. As in other phases of our economic life, the principal obstacle is unregulated competition. Left to themselves, and forced meanwhile to engage in a ruthless struggle for business, the timber companies find it impossible to think of the future. The impulse to cut without providing for regrowth outweighs the public interest in conservation. Public regulation of timber holdings is necessary, and also a fundamental readjustment in the prevailing method of financing the forest industries. Together, these things will promote a sounder forest economy, and lead to permanent communities rather than to abandoned towns. Along with public regulation of private timber holdings should go an extension of public forest ownership; for throughout large areas the problem of forest care and improvement is such that only public agencies can deal with it effectively.

Social as well as economic considerations vest forestry with a public interest. Living in or near the national forests alone are more than three-quarters of a million people partly or wholly dependent on these forests. Forest industries create local markets for farm products, provide work off the farm, increase community advantages, and lighten the burden of taxes. Forest improvement occupies people who might otherwise engage in commercial farming or in other overcrowded work. Forest recreation and wildlife afford sources of income. Forests should be protected and improved, not only to insure the Nation a continuous and adequate supply of forest products but to furnish employment and build stable communities. Moreover, their indirect value as a source of income is enormous. The forests help to protect growing crops, to control erosion and stream flow, and to conserve water for city needs and for power, irrigation, and navigation.

Hitherto our forest resources have furnished employment mainly through exploitation—through wasteful cutting and through practices that made restocking difficult or impossible. There is a better way. Forests may still furnish materials for the lumber industry, the pulp and paper industry, and other forest industries. At the same time they may be conserved and improved as a source of future supplies by means which furnish employment now and furnish also the guaranty of increased employment in the future. It is possible to remove timber in large quantities and leave the land in a better condition to grow more timber. This is an important object of the emergency conservation program. Following the creation of the Civilian Conservation Corps, the Government put to work in the

forests more than 250,000 unemployed young men and boys, many of whom had never had regular work before. They improved fire-prevention facilities, abated soil erosion, combated tree pests, and improved forest conditions in other ways. Eighty percent of the work was planned and supervised by the Department's Forest Service. The social value of the enterprise, immediate and prospective, is certainly very great.

An Economic Investment

On the economic side, the work was essentially an investment. It made the forest properties more valuable. The Federal public-works program in forestry had a counterpart in the States that have State forests. Also, the Federal Emergency Relief Administration, the Civil Works Administration, and the National Recovery Administration made funds available for the same general purpose. The Forest Service supervised a total expenditure, Federal and State, of more than \$200,000,000 for regular and emergency work in the forests. Manifold returns may be expected. Public administration of forest lands takes into account many things that private administration inevitably neglects, such as recreational values, grazing and wildlife values, erosion control, and water supplies. Forest conservation and improvement, as conducted during the last fiscal year through regular and special appropriations, works toward a coordination of forest uses, present and future, for the good of the entire Nation. It is an investment which may be relied on to produce dividends.

The Federal program of land acquisition was accelerated during the fiscal year. The Government acquired or placed under contract of sale 4,206,560 acres of privately owned forest land, as against 672,425 acres in the previous year, and a maximum of 547,925 in any earlier year. It is continuing the accelerated purchase program and preparing to establish shelter belts of planted timber throughout a hundred-mile strip of the eastern Great Plains area as a means of retaining soil moisture, checking soil erosion especially by wind, and facilitating the continued agricultural use of the land. The shelter-belt project will furnish part-time employment to many farmers.

State Participation Essential

To carry through on a national scale the measures of forest-land acquisition, reforestation, and forest improvement necessary to make the forest resources fully useful will be a prodigious long-time task. Extensive State participation is essential. The Department last year recommended an acquisition program involving both Federal and State action and placing at 224,000,000 acres the total to be acquired by public agencies within a suggested 20-year period. Since the accomplishment of this program turns partly on the willingness of the States to participate, it is obviously important to seek an understanding with each State as to the character, amount, and location of the land for which public ownership is necessary or desirable, and as to how the task involved should be apportioned. The National Resources Board and the Land Planning Division of the Agricultural Adjustment Administration are assembling data relating compre-

hensively to land and water use throughout the country. This study includes the whole problem of forest-land use, forest-land ownership, and the public forest-ownership program necessary to carry out a national land-use plan. State agencies are cooperating.

NEW FARM LEGISLATION

Congress at its last session passed much legislation of importance to agriculture, including amendments to the Agricultural Adjustment Act, new laws to regulate the production of cotton and of tobacco, a measure authorizing the President to negotiate reciprocal trade agreements with foreign countries, an act authorizing the creation of grazing districts out of the public domain, an amendment to the bankruptcy act granting extensions of time to distressed farmers for the payment of their debts and mortgages, and an emergency appropriation act providing, among other items, \$525,000,000 for relief in drought-stricken areas.

Amendments to the Agricultural Adjustment Act added cattle, peanuts, barley, rye, flax, grain sorghums, sugar beets and sugar-cane to the list of basic agricultural commodities. They authorized an appropriation of \$200,000,000 for dairy- and beef-cattle adjustments, and an appropriation of \$50,000,000 to buy dairy and beef products for relief distribution and to reimburse farmers for cattle destroyed in campaigns against tuberculosis and other diseases. The sugar amendments authorized a domestic production of 1,550,000 tons of sugar in the beet-sugar area and 260,000 tons of sugar in the cane-sugar area, and empowered the Secretary of Agriculture to make allotments for sugar imports. They provided also for processing taxes to finance the sugar control, and authorized the Secretary to purchase surplus sugar, not in excess of 300,000 tons, produced in the beet-sugar area and to distribute it for unemployment relief or to dispose of it in other ways consistent with the policy of the act. Still other amendments to the Agricultural Adjustment Act modified provisions relating to the processing tax.

Under the Bankhead Cotton Control Act Congress limited the amount of cotton marketable tax exempt from the 1934 crop, and provided for the collection of a tax from cotton sold in excess of the tax-exempt amount. The Kerr-Smith Tobacco Control Act applied a similar principle to tobacco and imposed a sales tax on all tobacco harvested in 1934-35 except Maryland tobacco, Virginia sun-cured tobacco, and cigar-leaf tobacco.

Tariff Act Amended

To facilitate the expansion of foreign markets Congress amended the Tariff Act of 1930. It authorized the President, whenever he finds that any excess duties or other import restrictions of the United States or of any foreign country restrict our foreign trade unduly, to enter into trade agreements with foreign countries. These agreements are not subject to Senate ratification.

By the Taylor Grazing Act Congress authorized the creation out of the public domain of grazing districts to comprise not more than 80,000,000 acres. The Secretary of the Interior is to administer these

districts under a system permitting bona fide settlers, residents, and other stock owners to graze livestock. In addition the act authorized the Secretary to permit homestead entry in tracts not exceeding 320 acres within such grazing districts when it appears that the land is more valuable for cultivated crops than for native grasses.

New bankruptcy legislation for the benefit of agriculture went into effect under the Frazier-Lemke-McKeown Act. This measure permits farmers who have not succeeded in getting their indebtedness adjusted to petition for bankruptcy and for an appraisal of their property. Appraisers appointed by the court will appraise the property "at its then fair and reasonable value, not necessarily the market value at the time of such appraisal." Then, with the consent of the lien holders, the property may be sold, in whole or in part, to the debtor on certain prescribed terms. These call for the payment of 1 percent interest upon the appraised price for the first year, and thereafter for the payment of a certain percentage of the appraised price, with interest at 1 percent on the unpaid balance, until the end of a 6-year period, when the remaining unpaid balance is due. Should the creditors reject the proposed arrangement the court must stay all proceedings for 5 years during which time the debtor may retain all or part of the property on payment of a reasonable rental. At the end of the 5 years, or earlier, the debtor may pay into court the appraised price of the property subject to reappraisal at the request of any lien holder. In the absence of such request, payment of the appraisal price will fully discharge the debtor and give him title to the property.

The Emergency Appropriation Act made available \$525,000,000 for relief in stricken agricultural areas to be allocated by the President to supplement previous emergency appropriations and for several additional purposes. Another measure authorized a \$40,000,000 appropriation to the Farm Credit Administration for crop-production loans.

Proposed A. A. A. Amendments

Certain proposed amendments to the Agricultural Adjustment Act did not come to a vote. These related to the enforcement of marketing agreements. All the major producers' organizations, including the National Grange, the American Farm Bureau Federation, the Farmers National Grain Corporation, and the National Cooperative Council endorsed them, as likewise did the Agricultural Adjustment Administration. Their purpose was to restate in explicit terms what the administration believed to be the original intent of Congress. Misleading statements stirred up considerable opposition. Opponents charged that the amendments represented an attempt to enlarge the powers of the Agricultural Adjustment Administration and it proved impossible to smooth out controversial points before Congress adjourned. In the original Agricultural Adjustment Act Congress empowered the Secretary of Agriculture (1) to issue licenses permitting processors, associations of producers, and others to handle farm products in interstate or foreign commerce; (2) to suspend or revoke licenses for violation of the terms and conditions thereof; (3) to fine anyone handling farm products in such a manner without a license; and (4) to require licensees to furnish reports and

keep suitable accounts. In attempting to enforce these provisions the Administration met with resistance. Minorities took advantage of technicalities and ambiguities in the law. They strove to prevent the enforcement of licenses and consequently to defeat the purpose of marketing agreements.

Generally it is essential to couple marketing agreements with licenses enforceable against obstructing minorities. Whatever blocks enforcement of the licenses blocks the purpose of the agreements. Accordingly the amendments in question sought to remove uncertainties in the law, and to specify more clearly the Secretary's power to enforce these marketing arrangements against the recalcitrant few. In several cases the lower Federal courts have decided the licensing powers exercised by the Secretary of Agriculture were properly exercised. Litigation and other obstruction nevertheless continued and seemed likely to increase pending a more definite statement of the Secretary's licensing powers.

Marketing agreements covering a great variety of crops were in effect when the amendments were proposed. These agreements covered fluid milk and cream, tobacco, peanuts, rice, California deciduous-tree fruits, Northwest deciduous-tree fruits, California, Texas, and Florida citrus fruits, Flame Tokay grapes, clingstone peaches, canned and fresh asparagus, canned olives, walnuts, raisins, turpentine, and rosin. Licenses regulated the distribution of milk in many large cities. Not including increased returns to tobacco and milk producers, the benefit to farmers from marketing agreements and licenses in the 1933-34 season ran close to \$30,000,000. It would have been larger had the opposition of minorities not hampered the making and enforcement of agreements.

Opposition of Various Groups

Certain large distributors, processors, and handlers of farm products opposed the amendments. There was some opposition in Congress. The opposition contended the proposed clarification of the Secretary's powers involved an extension to him of additional powers. One objection was that the amendments would have permitted the licensing of individual farmers. Therefore the Administration proposed that a majority of producers affected by any license should have an absolute veto power over any of its provisions. One amendment would have allowed the Secretary, in making contracts with farmers for the reduction of basic crops, to stipulate that the production of nonbasic crops should not be increased. This provision, it was declared, would compel farmers to reduce their total production. No farmer, however, would have been obliged to sign any such agreement. There was nothing in the amendments to change the voluntary character of the adjustment programs. The Senate Committee on Agriculture and Forestry favorably reported the amendments, but they did not come to a vote in Congress.

GRAIN FUTURES

The Grain Futures Act should be amended and extended. The present law, enacted in 1922, has served well the purpose of a pre-

liminary measure. It has provided a broad foundation of experience upon which to base more complete regulation of the speculative markets. However, the need for amendment and enlargement of powers under the act has been apparent for many years. At the last session of Congress a bill to amend the Grain Futures Act, H. R. 9623, passed the House of Representatives but was not reported out by the Senate Committee on Agriculture and Forestry in time for Senate action before adjournment. One of the important provisions of this bill was the power given to place a limit upon purely speculative trading on the part of any one person or firm. It provided also for the licensing of commission firms accepting orders from the public and prohibited, under severe penalty, the bucketing of customers' orders, the making of wash sales and fictitious trades, and cheating and fraud in connection with the handling of customers' orders.

There is, of course, a rather wide-spread opinion that speculation is harmful in itself and that curbing or prohibiting entirely dealings in futures would be desirable. The stubborn opposition of the exchanges to Government regulation of any kind, touching even practices which the exchanges condemn, has been largely responsible for this still growing opinion. Thus far the Department has counseled a regulatory policy, one which would preserve and strengthen the futures trading system. It has supported the view that a moderate amount of speculation in commodities gives life and liquidity to the market for such commodities and thus serves a useful economic purpose. But it cannot accept the view that in order to have those benefits it is necessary also to tolerate the evils of unregulated speculative markets, which in the long run far outweigh any possible good results.

For a late example of harmful speculation we need only go back to what happened in July 1933. Speculation in grains, induced in part, perhaps, by talk of monetary inflation, resulted in a much too rapid advance in prices during the period from June 20 to July 18. Commission houses, anxious for business, took and carried large speculative accounts without adequate margins. Large speculative lines were built up out of paper profits, and when the market finally lost its momentum there was no reserve power to sustain values. Over-extended traders could not stand even a small price recession. Consequently, on July 18 and 19, wheat prices broke practically 30 cents a bushel and a serious financial crisis was averted only by the fortunate turn of circumstances.

The effect of the market crash just mentioned was to destroy entirely the morale not only of the professional speculators but of those who speculate moderately and on the basis of conservative appraisement of values. That experience so frightened the speculatively inclined that the grain markets suffered by it for a full year afterward. In this case speculation helped boost prices for a short time, but to farmers who were getting ready to harvest their crops at that time it gave only a false hope. Instead of benefiting by the price advance they reaped the inevitable fruits of overspeculation—extended market stagnation and a price dominated by fear psychology.

FOOD AND DRUG CONTROL

That the existing Federal Food and Drugs Act has sharp limitations is generally recognized, and the Department has long advocated stronger legislation. In 1933 it prepared a new food and drugs bill, which was introduced in the Senate and considered by the Senate Committee on Commerce. Two hearings resulted in material modifications of the draft. In March last the committee favorably reported the revised bill (S. 2800). This measure retained most of the provisions advocated by the Department for the protection of consumers and would have controlled the traffic in food and drugs more effectively than the existing law. In addition, it would have regulated the cosmetics trade and the advertising of foods, drugs, and cosmetics. Unfortunately, the bill did not come up for passage. At the next session of Congress the Department will again request the introduction of an adequate food and drugs bill.

The measure considered at the last session contained nothing new or startling. It simply provided means to deal with needs that have become more and more evident in recent years. Officials charged with the duty of protecting the public health have time and again recommended the essential features of the measure. Like the existing Food and Drugs Act, it would have benefited all honest manufacturers as well as consumers. Nevertheless, bitter opposition developed. The opposition came not only from interests not too scrupulous of the public welfare but from reputable manufacturers, and even from some consumers, whom misrepresentation of the bill had misled.

Under the Sherley amendment to the existing Food and Drugs Act the Government has the formidable obligation of proving that the claims made in the labeling of patent medicines are both false and fraudulent. This requirement, which the proposed bill would have changed, has been one of the most serious handicaps enforcement officials have had to meet. In one case, that of a horse liniment sold as a cure for human tuberculosis, the Government spent \$75,000 over a period of 10 years trying to get the false claims off the label. Though the first case was tried in 1922, only in March of this year was the manufacturer at last brought to book and sentenced to a fine of \$2,000. Another provision exempting any food product sold under its own distinctive name from all restrictions except those relating to the addition of poisonous or deleterious ingredients had no counterpart in the new bill.

Besides cosmetics and advertising, curative devices and contraptions, and products like the so-called "reducing agents", which are now immune, would have been brought under control. Provisions as to labels were considerably amplified to enjoin not only the truth but the whole truth, that the consumer might have sufficient information to protect both his health and his pocketbook. The bill also gave the Federal Government authority to set up a standard of quality and identity for all food products, and to establish safe tolerance for poisons in foods. As the light fines imposed under the present law seem to be regarded by some manufacturers as no more than license fees for carrying on an illegitimate, if profitable, business, the bill provided more drastic penalties, with injunctions against chronic offenders.

Right of Self-Medication Not Denied

One false objection was that the bill denied the right of self-medication. Actually it would have made self-medication safer. It would have driven from the market drugs that are dangerous for the layman to prescribe for himself and would have permitted only such claims for home medicines as they could fulfill. Another groundless objection was that the proposed law would have doomed advertising by insisting on the truth. This charge involves the ridiculous assumption that American business depends on dishonesty. Still another misrepresentation was that the bill would have allowed only factual advertising. The Supreme Court has definitely recognized "trade puffing" as legitimate.

False advertising should not be continued without restraint. In proportion as buying power goes for harmful things consumers have less to spend for things that are worth while and honest advertising is less effective. Honest industry should welcome an advertising standard to which its practice may profitably conform. Advertisers can tell the truth and still do business profitably.

Opponents of the proposed food and drugs bill alleged also that it conferred czaristic power upon the Secretary of Agriculture. This allegation had mainly to do with provisions authorizing control of food and drugs traffic through licensing, where the public health could not be protected otherwise. Opponents objected likewise to a provision for the establishment of permissive supervisory inspection. Subsequently the sea-food industry requested this type of regulation for itself. It was granted through an amendment to the existing Food and Drugs Act.

Pressure of other legislative business, as well as the objection of certain interests, prevented enactment of the bill. Pending its reintroduction, the Department will continue to urge the wisdom and necessity of its provisions.

Despite the shortcomings of the existing law, its enforcement wrought further improvement in our food and drug supply during the last year. Routine enforcement directed regulatory action against violations affecting the public health, violations involving filth or decomposition in foods, and violations resulting in economic fraud. In the last fiscal year the Food and Drug Administration reported more than 1,000 shipments of foods, drugs, and stock feeds to the Department's solicitor, as a basis for criminal prosecutions. It caused seizure actions to be directed against 1,226 consignments of foods, 435 consignments of drugs, and 24 consignments of stock feeds.

Sea-Foods Problem

A major problem is the protection of the consumer against filthy and decomposed food products. Because of their highly perishable nature, sea foods require special attention. Such products, both canned and fresh, create many occasions for seizures and prosecutions. Protection of the consumer requires the scrupulous attention of manufacturers to the character of the raw fish products, to rapid and sanitary handling, and to proper sterilization. The previously mentioned amendment to the Food and Drugs Act allows the Secre-

tary of Agriculture, at the request of any packer of sea foods sold in interstate commerce, to inspect the product at the manufacturing plant. Manufacturers may appropriately label goods that have passed the inspection. They receive the service at cost.

Research in the Food and Drug Administration developed some new methods to reveal the presence of filth in dairy products. These methods led to the seizure last year of numerous consignments of low-grade butter of the type known as packing-stock butter. Among the seizures were some consignments of alleged creamery butter. The resulting legal actions stimulated dairy processors to improve the methods of making and handling butter.

Another big problem is the control of poisonous spray residue. The Food and Drug Administration maintains an extensive surveillance of interstate shipments of fruit and vegetables by both truck and rail. Fruit and vegetable producers and dealers are beginning more and more to recognize the importance of spray-residue control. State authorities support the movement vigorously. In consequence the number of legal actions necessary in the last fiscal year declined. Only 58 seizures of fruits and vegetables for excessive spray residue had to be made in 1934 as compared with 241 in the fiscal year 1933.

Liquor Adulteration and Misbranding

Prohibition repeal created new problems for the Food and Drug Administration. Under prohibition the regulation of alcoholic liquors was the task of other Government agencies. When traffic in alcoholic beverages became legal, the Food and Drug Administration had to apply to it the terms of the Food and Drugs Act. It did not receive additional appropriations for this purpose. As may easily be imagined, it would be possible to divert to this one purpose the entire appropriation for enforcing the Food and Drugs Act. Since this would be manifestly inexpedient, the administration concentrated attention on the most serious types of liquor adulteration and misbranding.

In accordance with this policy the administration made a survey of whiskies labeled as medicinal. It caused actions to be instituted against brands not up to the requirements of the United States Pharmacopœia and not clearly labeled to show their deviation from that standard. Misbranding of beverage whisky amounting to definite misrepresentation prompts administrative action. However, the character of the liquor traffic obviously makes special legislation necessary. Many types of liquor adulteration and misbranding cannot be proved, or even detected, by chemical analysis.

Among the byproducts of prohibition repeal are candies containing alcohol in liquid centers. Such articles are vicious, particularly in view of their consumption by children. Confections containing alcoholic, spirituous, and vinous liquor have been held illegal under the Food and Drugs Act from the beginning. They do not become legal simply through the repeal of prohibition. Purveyors generally bootleg these preparations. It is difficult to track down and establish the interstate character of the shipments. Nevertheless, the administration seized 18 consignments and practically drove liquor candies out of interstate commerce.

RESEARCH

Research is the Department's biggest job; indeed, research is the foundation of everything it does. It could not help farmers to plan their production, to reduce their costs, to fight the diseases and pests that attack animals and plants, to produce better crops and livestock, and to market their products efficiently, without first studying how these things may be done.

Yet some persons believe there is a conflict between agricultural research and the need to adjust agricultural production. Agricultural science enables farmers to increase crop yields per acre, and to increase the output of meat and milk per unit of feed consumed. How, it is asked, can this be reconciled with the present necessity to restrict certain kinds of farm production?

The contradiction is unreal. When farm production exceeds the demand, it should be reduced not by discarding science, but by planting fewer acres or raising fewer animals. There is no advantage in allowing costs per unit of production to increase, as would be the result of giving science a holiday. By letting pests and diseases ravage their crops, and by harvesting inefficiently what remained, farmers could doubtless reduce their output, and raise the prices of farm commodities. But they would increase their unit costs of production out of all proportion to any conceivable gain in prices, and would produce goods of low quality.

It is therefore wrong to say that agricultural research should be curtailed when crop adjustments are in order. In fact, the need for research is greater then. The character of the work should perhaps be somewhat changed. The crisis through which American agriculture is passing gives a new direction to agricultural research and a new importance to certain kinds. Especially it emphasizes the worth of investigations having an immediate social application.

In shaping its research to meet the emergency, the Department has kept this principle firmly in mind. It has strengthened various studies promising wide social benefit, not only to farmers but to other economic groups. Examples are the economic investigations that furnish a basis for crop adjustments; the soil surveys and land classifications that influence subsistence homesteading, forestry, erosion control, and wildlife conservation; and diet studies that serve to guide public agencies in dispensing relief. We need technical progress in the distribution as well as in the production of wealth. Research devoted to that end joins economic science to production science without detracting at all from the value of the latter. It produces benefits that cannot easily be monopolized. Much research of this kind we have had, of course, for a long time. As we move away from ruthless competition toward efficient social cooperation, the scope and the need for it increase.

Social Value of Emergency Studies

Many studies made possible during the last year through emergency appropriations have outstanding social value. This Department gathered facts of tremendous national significance in a study of tax delinquency, which indicated the extent, the character, and the causes of the trouble. Results of this investigation may pro-

foundly influence Federal and State policy in reallocating land to better uses. Emergency funds facilitated animal- and plant-disease control and work on problems created by the drought. Emergency funds also aided research as well as action against bovine tuberculosis, Bang's disease, tick fever, endemic typhus, white pine blister rust, infestations of grasshoppers and chinch bugs, Dutch elm disease, and other scourges.

Special appropriations from Congress and grants from N. R. A., P. W. A., and C. W. A. financed statistical and economic studies, a farm-housing survey, and numerous miscellaneous activities. This Department furnished technical help to numerous Government agencies, in connection with unemployment relief, subsistence farming, work in the Tennessee Valley under T. V. A., code making and enforcement by the N. R. A., land planning by the National Resources Board, and tariff negotiations by the State Department. Investigations went forward looking to the solution of the spray-residue problem, the increased utilization of farm byproducts, the better adaptation of farm implements to farm needs, the breeding of drought-resistant agricultural plants, and the development of grasses suited to dry areas.

The Department cooperated extensively with the State experiment stations. The cooperative studies included surveys of soil resources in practically every representative agricultural area in the country; soil use and conservation; prevention of soil losses through erosion; establishment of superior types of farming; improvement of irrigation practices; more efficient and economical use of fertilizers; improvement of corn and other cereal crops, and of cotton grades and prices; breeding of potatoes resistant to disease; development and establishment of type varieties of vegetables; use of parasites to combat the oriental fruit moth; survey of plant diseases; increasing the efficiency of oil sprays for combating insect pests; improvement of conditions of livestock production, marketing, and meat utilization, and of the quality and palatability of meat; determining the relation of the conformation and anatomy of the dairy cow to productive ability; development of beefiness and milk production in dual-purpose cattle; use of proved sires in breeding for high milk and butterfat production; prevention and eradication of Bang's disease of cattle; establishment of a farm real estate tax index, and the use of land for grass and forage.

Federal Funds for Experiment Stations

The Secretary of Agriculture is charged by law with the responsibility of administering the Hatch, Adams, Purnell, and supplementary acts appropriating Federal funds for the support of the State agricultural experiment stations and of those maintained in Alaska, Hawaii, and Puerto Rico, and of coordinating the work of the Department with that of the stations. The funds so administered amounted to \$4,439,130 during the year ended June 30, 1934—\$90,000 to each State, \$15,000 to Alaska, \$62,270 to Hawaii, and \$41,860 to Puerto Rico, out of a total of approximately \$14,775,000 available to these stations from all sources. The funds were used for the prosecution of about 6,000 research projects, having as their

primary object the betterment of farming and the rural home. About 800 of the projects were carried on in cooperation with the Department of Agriculture. The Office of Experiment Stations represents the Secretary of Agriculture in administering the Federal funds for the stations.

GENETICS

Probably no single factor in the research program in the Department is more important than what we have come to call the search for "superior germ plasm." Briefly, this consists of the discovery and development of superior seed stock through applications of the art of breeding and the principles of genetics. Such superior material then becomes available for use by producers of grain and livestock, as well as to the scientists and practical breeders for further improvement.

The isolation of strains having superior germ plasm is of tremendous value in efficient production. Superior germ plasm helps the farmer, not only to produce more per unit, but also to produce plants and animals of better quality and greater usefulness. In the plant field much has already been accomplished in this respect and although progress has been much slower and less spectacular in the animal field, many of the principles of inheritance are being applied in the development of new and superior strains.

A recent exhibition displayed about 150 superior new varieties of field crops. By the use of three chief breeding principles (introduction, selection, and hybridization) plant breeders have developed hundreds of new varieties which are high-yielding, disease- and insect-resistant, of high quality, and superior in many ways to the ordinary varieties.

New, superior varieties of wheat, such as Turkey, Marquis, Kanred, Ceres, Federation, Tenmarq, Ridit, and Oro; varieties of oats, such as Logold, Albion (Iowa 103), and Markton; and varieties of barley, such as Hannchen, Trebi, and Gladron, to mention only a few, are now cultivated on more than 40 millions of acres of crop land each year. Apples of higher color and quality and strawberries adapted to canning and freezing are now available. Melons and peas resistant to wilt have been developed. Potatoes, such as the Katahdin, which is resistant to some of the baffling virus diseases, have been developed by Department plant breeders.

Progress With Livestock

In the case of the larger animals, livestock improvement involves such a long-time, expensive program that it is impractical to raise experimentally the large populations which are necessary for efficient progress. Nevertheless, the fundamental principles of inheritance are essentially the same in the animal as in the plant kingdom. It has been clearly established that genetic factors concerned with disease resistance, growth, body size, performance, and fecundity can be obtained in relatively homozygous conditions by application of the proper system of breeding and selection. Through introductions of the proper animal material and application of the correct breeding system, it is not only possible to concentrate important

hereditary factors in strains of domestic livestock but this is already being accomplished.

For instance, one outstanding achievement in cattle breeding is the development of the Santa Gertrudis strain of cattle by practical cattle breeders in Texas. The Department has under way a similar program in which the Brahman and Aberdeen-Angus breeds of cattle are being crossed for the purpose of combining certain desirable characteristics in homozygous condition. A similar experiment is being carried on simultaneously in which the imported Africander cattle are being crossed with the Aberdeen-Angus for a similar purpose.

By combining the Rambouillet and Lincoln breeds of sheep the Department has developed a strain, known as the "Columbia type" sheep, which is particularly adapted to the conditions found in the Northwest intermountain region. The Department is also experimenting with combinations of Southdown and Corriedale breeds of sheep for the purpose of producing more efficient and true-breeding strains of sheep for hothouse lamb production. Recently the Department imported 24 Landrace and 6 Yorkshire hogs from Denmark for use in the development of superior strains of hogs. An important part of the improvement program with cattle, sheep, and swine consists of record-of-performance tests, in which efficiency of feed utilization and quality of animal products are evaluated.

For the last 15 years the Department has followed a constructive breeding program in its dairy herds, using sires that possess a high degree of genetic purity for the factors that determine high milk production as indicated by the production performance of their daughters. By concentrating the superior germ plasm of such sires it is making progress toward the development of strains of cattle that will be pure in their inheritance and transmitting ability for a high level of milk production.

In poultry, Department workers have demonstrated that first-year egg production is determined largely by four heritable characters, sexual maturity, rate of laying, absence of broodiness, and persistence of production. By the proper selection of breeding stock, based on the progeny test, it is possible to develop superior laying strains that are comparatively homozygous. For the past decade poultry breeders in several States have been carrying on record-of-performance work on their own premises, with the object of identifying superior sires and dams and perpetuating superior strains of laying stock. The various State rules and regulations governing the poultry record-of-performance work are standardized through an unofficial organization known as the "United States Record-of-Performance Federation."

Interbureau Committee on Genetics

No conservation of natural resources can mean more to posterity than the production of strains of plants and animals relatively homozygous for efficient production of high quality. The Department of Agriculture is devoting itself to the long-time job of developing strains of this type. An interbureau committee is taking an inventory of the Department's genetic accomplishments, prepara-

tory to further intensive research, and preparing to catalog, for the use of scientists and farmers generally, the superior strains of plant and animal breeding stock now available.

PROGRESS IN PLANT BREEDING

Research designed to increase the efficiency, stability, and quality of crop production has proceeded along the same general lines as in previous years, but on a scale reduced to meet the drastic cuts in appropriations for this purpose. In spite of the reduced support, the plant scientists of the Department have continued to make notable contributions to a more efficient agriculture and thereby to the general welfare of all of the people, urban and rural.

When the results of plant improvement are measured in terms of acre yield, the larger average yield over a period of years frequently is due more to preventing ruinously low yields in occasional years than to raising the general level of yield. Thus the improvement tends to stabilize production and to permit more definite planning. Stem rust long has taken its toll from the Nation's wheat crop. The disease is not equal in severity in different years, but may be either negligible or devastating in its effect on susceptible varieties. The breeding of more resistant varieties by the Department in cooperation with the State experiment stations has reduced markedly, though not eliminated, the hazard of rust damage from wheat growing in the northern Great Plains, by providing Ceres, Thatcher, and other resistant sorts. Similar advances have been made in reducing the hazards due to winter-killing and smut injury.

Developments in oat breeding tend to stabilize the acre yields of that crop. Losses due to crown rust, stem rust, and the loose and covered smuts of oats have been severe in some seasons. Varieties already have been developed that are resistant to one or more of these diseases. More recently, strains have been obtained through hybridization and selection that are resistant to all four. It remains to determine by adequate field trials that these new strains have no serious unrecognized faults before they will be ready for distribution.

Plant improvement rarely is devoted to the sole purpose of increasing yield. Quality is equally important. Rust and smut decrease both the yield and the quality of wheat, and the gains in quality from the development of resistant sorts are frequently more important than the gains in yield alone. A few years ago practically all of the wheat from some of the shipping stations in the Pacific Northwest was very smutty, with consequent heavy dockage and a very low price. With the use of such smut-resistant varieties as Redit, Albit, and Oro in these areas, most of the wheat now coming from the same stations is smut-free and without penalty.

Progress in developing better strains of corn by selection and crossing has been continued. Larger yield is not the only objective. The corn breeder strives to develop hybrids that stand up better in storms and produce a smaller proportion of unsound low-grading grain. During the past year it was discovered that strains of corn differ markedly with respect to the constitution of their starch. In some the percentage of amylose, the valuable constituent, was as high

as 93 percent, and in others as low as 63 percent. This fact provides a basis for breeding varieties of much greater value to the starch industries than any now existing.

New Varieties of Fruits

Improved varieties or practices making for a better quality of product are even more important with fruit and vegetable crops than with field crops. Through breeding and selection the Department recently has produced a number of varieties of strawberries having special merits as to quality and adaptation. The Dorsett and Fairfax, introduced in 1932, have unusually high dessert qualities. Others are the Blakemore, excellent as a preserving berry; the Bellmar, a berry of good quality that ships well; and the Southland, which is especially adapted to southern latitudes and has high merit for the home garden.

Losses due to alfalfa wilt are not alone those apparent in lower yields from year to year. Without this disease, the life of established fields would be materially longer. Growers would save on costs of reseeding and would avoid losses incident to the more frequent establishment of new fields. Foundation stocks of alfalfa that are vigorous and wilt resistant have been isolated by self-fertilization and selection, an important step toward the control of alfalfa wilt.

New fruit, vegetable, and field crops introduced by the Department constitute a valuable element of our present agriculture. The introduction of Korean lespedeza, introduced in 1921, has been extended to more than 5,000,000 acres with gratifying results. This legume has shown ability to withstand unfavorable conditions of various kinds. Even during the severe heat and drought in 1934 it maintained itself in Missouri and provided a little grazing when other crops failed.

The Department has obtained varieties of soybeans adapted to areas for which varieties previously were not available. Earlier maturing strains found among the Department's extensive recent introductions from abroad will permit utilizing this valuable crop farther north than heretofore. One of these, the Cayuga, may be counted on to mature in much of New York during any normal season. Its value as a home-grown source of protein for the extensive dairy industry in that State has been demonstrated.

The development of a variety resistant to some disease or insect pest may permit continued production of a particular crop in a locality that otherwise would have to make expensive shifts in farm practice or even be abandoned for agriculture. The success of the Department some years ago in rehabilitating sugarcane growing in Louisiana and the other Gulf States by the introduction of mosaic-resistant varieties is well known. This has maintained a production worth more than \$20,000,000 annually, and conserved investments in mills and special equipment of more than \$100,000,000.

Through further importations and breeding, other resistant varieties have been obtained possessing characteristics which adapt them to special conditions of soil, harvest, and the like. During the present year two new varieties of sugarcane having additional superior characteristics, C. P. 28/11 and C. P. 28/19, were released by the Department for general culture. The problem does not stop here

however. During recent months a new form of the mosaic has been found in commercial fields of hitherto resistant varieties of cane. This calls for immediate steps looking to the finding and breeding of varieties resistant to the new menace as well as the old.

Influence of Light on Germination

Results that may have importance with lettuce breeding and production have just been obtained in studies of the influence of light on the germination of lettuce seed. Lettuce seed has a period of dormancy following maturity, during which it will not germinate under ordinary conditions. Thus, seed produced in the regular lettuce-seed sections of northern California is harvested in August and cannot be used for early planting the same fall in the Imperial Valley. It has just been determined, however, that some kinds of lettuce seed, if soaked and exposed for a few minutes to daylight, will germinate immediately. The experiments have not gone far enough to predict whether this treatment will be useful in connection with commercial lettuce production. It is almost certain, however, to be of value to lettuce breeders in shortening the time between generations.

It is not always possible to breed a variety resistant to some disease, and other methods of control must be developed. Recent investigations in controlling tobacco mildew or the blue-mold disease have produced important results. In repeated experiments excellent control was obtained in 1934 by maintaining the tobacco beds at night temperatures of above 70° F. during periods favorable for disease activity. It appears to be unnecessary to begin heating to maintain temperatures until after the disease is evident, and relatively crude methods of heating can be used. This discovery will materially reduce the cost of obtaining stands of tobacco without significantly increasing final production.

The Department's investigations with the apple, peach, and orange have shown clearly that the removal from the tree of part of the crop early in the season results in much higher quality and size of those fruits left. The larger leaf area per fruit after the thinning makes available more carbohydrates and other elaborated foods per fruit, resulting in increased size and sugar content. Peaches and apples develop a brighter color over a greater proportion of their surfaces. Biennial bearing varieties of apples tend to produce annual crops if the fruit thinning is severe enough that sufficient foliage is available not only for developing the crop but for forming fruit buds in addition. All of these research results are being put into profitable practice.

DAIRY INVESTIGATIONS

As a result of the Department's progress in developing pure-line-production herds and in spreading genetic knowledge, farmers and breeders are becoming more and more interested in obtaining proved sires to head their dairy herds. At present the number of proved sires is very limited, but the breeding work has demonstrated that the sons of proved sires can be used with greater assurance that they will transmit higher production than the sons of untried bulls. As a part of the Department's breeding experiments, all young sons of proved

sires are placed in neighboring farm herds to be proved. The 505 daughters of 52 young Holstein-Friesian bulls loaned to farmers near the Huntley, Mont., station have production records that exceed their dams' records by an average of 1,601 pounds of milk and 69 pounds of butterfat. The 145 daughters of 16 young Jersey bulls loaned from the Beltsville, Md., herd have records that exceed their dams' records by an average of 817 pounds of milk and 56 pounds of butterfat.

Criteria for Judging Cattle

Investigators in the Department are studying the relation between the outward conformation and the size of the internal organs and body parts, and the relation between both conformation and internal anatomy and producing capacity, for the purpose of providing a scientific basis for judging. They have found marked variations in the size of the internal organs of animals of similar conformation. For example, little relation exists between width of chest and size of heart and lungs, whereas the depth of chest is rather definitely correlated with the size of these organs; size of heart is rather closely correlated with body size, body circumferences, and body depths but less closely with height, widths, and lengths of body; lung weight is more highly correlated with lengths and depths of body than with other body measurements; and length of intestines is more closely correlated with body size, weight, and body depths than with other body measurements.

Milk secretion has been shown to be a continuous process except as it is interfered with by fright, pain, or internal pressure due to accumulation of milk in the udder. Moreover, it has been found that practically all of the milk obtained at a milking is in the udder when the milking process commenced rather than being secreted during the brief period of milking. The discovery led to experimental work which has shown that incomplete milking does not cause udder troubles nor tend to dry off cows quicker. This information may lead to the discontinuance of the laborious chore of stripping after machine milking.

Dairymen have long been urged to grow and feed more roughage, as a practical means of cutting feed cost of milk production. Recent investigations in the Department indicate that it is important to use good quality roughage, especially roughage with a high vitamin A activity, because of its beneficial effect on the general health and reproductive functions of dairy cows, and also on the nutritive value of their milk. Many premature births are caused by vitamin A deficiency, a condition that might be avoided by proper attention to the quality of the roughage fed. In seasons of exceptionally dry pastures this deficiency is likely to be aggravated, and may call for supplemental feeding with cod-liver oil, carrots, or other feeds rich in vitamin A.

Feeding experiments have shown that roughage is more nutritious and more palatable when cut in the earlier stages of maturity than when allowed to ripen before cutting, and the immature cuttings yield more protein per acre. Furthermore, at field stations cows have produced 75 percent as much butterfat on good roughage alone

as they produced when fed heavily on grain with roughage. This information indicates that dairy farming, in many instances, would be more profitable if the farmer devoted all or most of his land to pasture and forage crops, and fed grain only when the prices of butterfat and the additional yield warranted the purchase of grain. Such a "back to grass" program would not only put the individual dairy farmer on a more permanently profitable basis, but would tend to retard production of a surplus of dairy products.

Miscellaneous Dairy Studies

Ice-cream studies in the last year have resulted in the development of a method by which the density of ice cream can be increased to any desired point by pressing to remove the air. The Department has perfected a method for merchandising natural cheddar cheese in small, attractive, consumer-size packages. Such packages should have wide-spread consumer appeal and should stimulate consumption. The process consists essentially in sealing the freshly made curd in valve-equipped cans, in which normal ripening takes place, and in which the cheese is also retailed to the consumer. Such a package may carry the name of the cheese maker direct to the consumer and should encourage manufacturers to make a high-grade product. Several companies have started packaging cheddar cheese in this way. Tests made of methods and materials for wrapping swiss cheese when it is cut for distribution to the retail trade indicate that it is possible to wrap the cheese so that it may be held for about 2 weeks without molding or noticeable loss of moisture, depending on the temperature at which the cheese is held. Dairy scientists this year developed a suitable package for merchandizing skim-milk powder in small consumer-size units. Making skim-milk solids available to the average household should increase the sales of this valuable product for use in home cookery.

ANIMAL INDUSTRY PROBLEMS

Early in 1934 Federal funds for the eradication of bovine tuberculosis became available through the Civil Works Administration. Several States assigned additional veterinarians to the work which was conducted under the joint supervision of Federal and State authorities. Local men assisted the veterinarians. During the few months that the C. W. A. project was in operation, approximately 1,000,000 cattle were tuberculin-tested in eight States. This completed the tuberculin-testing of cattle in many counties, and placed these counties in the modified-accredited area; that is, in the area in which the prevalence of the disease has been reduced to less than 0.5 percent. For this project the Civil Works Administration provided approximately \$170,000.

Certain amounts later provided in the La Follette amendment to the Jones-Connally Cattle Act were allotted to the Bureau of Animal Industry to further the eradication of tuberculosis and of Bang's disease or infectious abortion.

Bang's disease exists in practically all localities where cattle are handled. It is a serious menace. In cooperation with the States,

the Department proceeded with eradication work. The project provides for the payment of a Federal indemnity for cattle that react to the disease. Participation is voluntary on the part of the cattle owner, but if he participates he must agree not only to the testing of his cattle but also to the management of his herd to prevent reinfection.

The maximum Federal payment for grade cattle reacting to the Bang's disease test is \$20. For purebred registered cattle it is \$50. Up to the date of this report no State except Virginia has made an indemnity payment. Virginia has made a limited appropriation for the purpose. The owner of reacting animals receives the net salvage in addition to the Federal payment, though he may not receive more than the appraised value of the animals. Approximately \$17,000,000 has been tentatively allotted for the Bang's-disease project. The appropriation is available until the end of the calendar year 1935.

In connection with the enforcement of the Packers' and Stockyards' Act, a Federal statutory court upheld an order prescribing reasonable rates to be charged by the stockyard company in Omaha, Nebr., and the rates were put into effect. The estimated saving to farmers who use the Omaha livestock market is about \$100,000 annually. The Secretary of Agriculture also issued orders prescribing charges at the stockyards in St. Joseph, Mo., and commission rates at the livestock market in Chicago, Ill. Federal courts temporarily restrained the enforcement of these orders. Pending a decision on these cases, the courts have required the stockyards and market agencies affected to set aside funds representing the difference between existing rates and the rates ordered. In the event that the cases are decided in favor of the Government, the impounded funds will be distributed to the shippers. The savings to farmers, if the orders are upheld, will be about \$700,000 annually.

In livestock research record-of-performance studies with cattle and swine continued to demonstrate the wide variations which exist in the breeding efficiency and production efficiency of animals of similar ancestry. For example, there was a difference of nearly 5 months in the time it took beef steers of the same breed to reach finished weights of 900 pounds. Also calves that were heaviest at birth made the most rapid growth, required less feed per 100 pounds of gain up to weaning age, and reached final slaughter weights in the shortest time. However, no relationship was found between the weight of the calves at birth and the carcass grade they attained. In tests of dual-purpose bulls of similar breeding, individual sires differed widely in the transmission of the ability to produce beef efficiently. Similar wide variations in performance were found also with swine.

Meat Investigations

Meat investigations conducted by the Department in cooperation with State experiment stations and other organizations furnished important information on the factors which influence the quality and palatability of meat. The high value of good pasture for meat production was again demonstrated in a cooperative study with the Tennessee Agricultural Experiment Station. Lamb produced on good pasture and ewe's milk was equal in finish and palatability to

lamb produced under similar conditions, but with the addition of grain to the ration. With fattened hogs, as the final feed-lot weight and finish increased between 145 and 225 pounds, the cooked meat showed a gradual though small improvement in tenderness, in the flavor of lean, and in the quality of the juice. When hogs were carried to heavier weights and greater finish there was a decline in these characteristics or no further improvement.

Veterinary Congress

Coming to the United States for the first time in the 71 years of its existence, the International Veterinary Congress held its twelfth convention in New York City August 13-18, 1934. John R. Mohler, Chief of the Bureau of Animal Industry, was elected president. An outcome of the convention was a movement toward increased international cooperation in research and in the dissemination of research results. The veterinary congress discussed the inspection of meat and milk, and manifested special interest in measures for the protection of consumers.

INSECT PESTS

Unusual weather over much of the country during the last year was favorable for certain insect pests. Many species which normally occur only in limited numbers became abundant and did material damage. In some sections, however, such as the northeastern part of the United States, certain common species were less abundant than usual. Buffalo gnats or black flies occurred in outbreak numbers in parts of the lower Mississippi Valley and caused material losses to livestock and poultry. The green bug, the corn flea beetle, the introduced sawfly which injures wheat and related grains, the pea aphid, and the San Jose scale occurred in outbreak numbers in various regions. The mild winter was favorable to the overwintering stage of the codling moth. The drought in the Middle and Far West favored the increase of grasshoppers and chinch bugs.

That excessive numbers of grasshoppers would occur over a large part of the north-central region was demonstrated by surveys in 1933, which indicated that certain species which migrate long distances would occur in large numbers unless natural causes intervened. To aid in protecting crops in infested areas, Congress appropriated \$2,354,893 and authorized the Department to furnish materials for bait to States willing to organize and finance local campaigns. Many States organized campaigns which were very successful, though in drought-stricken areas crop damage from drought obscured the results.

Excessively large numbers of chinch bugs entered hibernation in the fall of 1933. The mild winter favored their overwintering. They emerged from hibernation and entered the small-grain fields much earlier than usual. This attack caused excessive losses in Iowa, Kansas, Nebraska, Illinois, Indiana, and Missouri. Unusual measures were necessary to protect young corn from the first generation of bugs, which migrated into the corn as the small grains dried up from drought or were harvested.

Congress appropriated \$1,000,000 to purchase materials for the construction of barriers to prevent the bugs from migrating into young corn, and authorized the Department to cooperate with States that would undertake to receive, distribute, and bear the expense of handling and utilizing the materials. In limited sections the first-generation bugs had left the small grains and moved into corn before the cooperative effort to prevent damage by the first generation was under way. Over the area as a whole, however, the control campaign was markedly successful.

Mosquito-Control Campaigns

The Department cooperated in extensive campaigns to control pest and salt-marsh mosquitoes. In cooperation with the Civil Works Administration, it organized campaigns to control pest mosquitoes in 33 States. This work cost approximately \$1,726,940 and furnished more than 2,805,000 man-hours of employment. The campaigns resulted in material benefit, and received general endorsement. Many communities undertook to maintain the ditches and other devices constructed as a part of the control operations. In many States and localities the work was continued or expanded when the Federal Civil Works projects were discontinued. Besides reducing the annoyance and dangers caused by mosquitoes, the campaigns demonstrated the practicability of mosquito-control operations during the winter. In certain sections along the Atlantic coast it was practical to couple mosquito control with reduction of the number of sand flies, which are a serious pest there.

With the aid of labor supplied through the Civilian Conservation Corps and other emergency agencies, the Department made progress in controlling outbreaks of bark beetles, which are a menace to important forest trees, particularly in the West. It conducted surveys to determine areas where control might be effectively undertaken and to furnish estimates of the cost. In California 22 C. C. C. camps did work to control the bark beetles between July 1, 1933, and April 1, 1934. The benefit should be great and lasting. As evidence of the value of such campaigns, it may be noted that during 1934 only 13 infested trees were located in the Crater Lake National Park. When control operations were undertaken there in 1932, it was necessary to treat more than 20,000 infested trees. Similar results have been obtained in many other sections. Even small projects, as, for example, one conducted in the Kootenai National Forest, have preserved valuable stands of western white pine.

A serious outbreak of the Dutch elm disease, which has caused wide-spread destruction of susceptible elms in western Europe during the past 16 years, was disclosed in parts of New Jersey, New York, and Connecticut, and in the vicinity of New York Harbor. The disease was first discovered in this area in June 1933. Last fall and winter scouts located some 1,500 diseased trees scattered over approximately 1,400 square miles. An unexpectedly rapid development of the disease took place at the beginning of the growing season in 1934. Infected trees began to show serious wilting by May 20, and within a month many diseased trees were dead or dying. By the end of June, 3,255 such trees had been found in the States, as follows: New

Jersey, 2,012; New York, 1,235; and Connecticut, 8; and up to July 31, 6,500 diseased trees were known to be infected. The above conditions are attributed to the growth of overwintering infections which developed rapidly in the new current season's sapwood.

Bark Beetles Transfer Elm Disease

Work in Europe and preliminary studies in the United States indicated that certain bark beetles transfer the disease from tree to tree. Entomologists in the Department are studying the habits and distribution of these insects. There is no known cure for a diseased tree. The removal and burning of affected trees is the only practical method of preventing the spread of the disease. This has been done as rapidly as possible with the State and Federal funds available. The unexpectedly large number of infected trees made it impossible, however, to do all the eradication necessary. Eradication of the disease appears to be practicable, but the scope of the work must be enlarged. Delay will increase the eventual cost. The disease was located at three other points—at Cleveland and Cincinnati, Ohio, in 1930, and at Baltimore, Md., in 1933. But at these points the European elm bark beetles apparently were not established. Eradication of the diseased trees appears to have been effective in these cases.

Spreading through Mexico, the Mexican fruit fly reached the northern border of that country some years ago and was first found in the lower Rio Grande Valley of Texas in 1927. It has persisted in that area in small numbers, despite efforts made by the State and Federal Governments and by the growers to eliminate it and to prevent reinfestation from Mexico. Suppression measures, consisting of the maintenance of a host-free period and the spraying of groves in which flies were found, have been continued.

Japanese Beetle at St. Louis, Mo.

The most important extension of the range of the Japanese beetle discovered in recent years is an outbreak in St. Louis, Mo. The insect was first picked up there by Boy Scouts in 1932. Several additional beetles were found in 1933, but information concerning the matter did not reach the Department until the spring of 1934. The infested area was something over 1 square mile. This is the first infestation of this size occurring west of Pennsylvania, although a few beetles have been taken in traps at intervening points, usually along railway lines. Officials of the Missouri State Department of Agriculture and of the city of St. Louis are anxious to suppress this infestation, and have made available their somewhat limited resources and equipment for eradication work.

CHEMISTRY AND SOIL INVESTIGATIONS

The protection of agricultural products and equipment against the destructive action of insects, micro-organisms, fire, and other agencies is one of the Department's major activities. Losses to American agriculture from these various causes are conservatively estimated to exceed \$2,000,000,000 annually.

Work upon rotenone has led to a vast increase in the use of this new insecticide. During the past year 500,000 pounds of derris root was imported for manufacture into rotenone-bearing dusts, extracts, fly sprays, etc. The high toxicity of rotenone-containing products to such insects as the cabbage worm, and their harmlessness to man and animals, adapt them for use as insecticides upon vegetables. More than 300,000 pounds of derris dust was employed during the past season on cauliflower alone.

Domestic sources of rotenone, such as the common weed known as "Devil's shoestring" (*Cracca virginiana*), are being surveyed.

A harmless means has been discovered for preventing the objectionable darkening of sliced fruit and vegetables without the use of sulphur dioxide, the presence of which in excessive quantities has caused the rejection by several foreign countries of certain American exported products. The commercial development of this new process is expected to be of great benefit to agriculture.

Farm fires in the United States in 1933 caused damage exceeding \$100,000,000 and resulted in the loss of approximately 3,500 lives. American agriculture can ill afford this heavy "fire tax", which for the entire United States amounts to an average of about \$16 per farm. This excessive drain is being alleviated through the Department's introduction of safety codes, by published instructions on the prevention and control of farm fires, and by an active educational campaign in cooperation with 4-H clubs and other organizations. By the adoption of the Department's recommendations, there has been a marked reduction in calamities of this description.

An additional hazard in the case of industries handling grain, flour, starch, sugar, cattle feeds, food products, insecticides, fertilizers, and other agricultural products is that of dust explosions. In the last 17 years (1917-33) there have been more than 360 dust explosions of this character in which 281 persons were killed, 624 injured, and an estimated \$31,530,850 worth of property destroyed. The Department, cooperating with insurance companies and other protective agencies, has greatly reduced the number and violence of these accidents, with a considerable saving in life and property.

The Department developed a process for making a fine quality of white starch from cull and surplus sweetpotatoes. This led to an authorization by the Federal Emergency Relief Administration of funds not to exceed \$150,000 for the construction and operation of a cooperative sweetpotato-starch plant at Laurel, Miss.

Beverages from Cull and Surplus Fruit

Among other recent important developments may be mentioned the Department's improvement of methods of manufacturing potable juices, wines, cordials, and other beverages from cull and surplus fruits, a chemical study of the soybean in order to determine what varieties are best suited for oil and cattle-food production, and the application of the ethylene treatment for improving the quality of walnut meats (a new development which in the past year has increased the value of this crop to producers by over \$100,000).

For developing new methods for making useful products from straw, cornstalks, hulls, and other so-called "agricultural wastes",

the Department is conducting investigations in cooperation with the Iowa State College. A new laboratory building which is being erected at Ames, Iowa, for this purpose with P. W. A. funds, will be equipped with the latest apparatus for producing illuminating gas, chemicals, and other byproducts from farm wastes by destructive distillation, fermentation, and other treatments. The utilization of these cellular wastes for paper, fiber board, and other promising commodities is being investigated. The problems are being studied from the viewpoint of the economic conditions in each agricultural section. Results of this work will help farmers to derive a profit from organic refuse which in many instances is now entirely wasted.

The Department recently discovered methods for fireproofing fabrics which will permit the employment of cotton cloth for awnings in many cities where this is not permitted by present fire-protective regulations. Similarly its work on the development of improved vat dyes of greater fastness to light will extend the use of cotton goods. The Department's production of gluconic acid and other valuable organic chemicals by the mold fermentation of corn sugar is another illustration of how chemical research can widen the market for agricultural products.

Results of Fertilizer Studies

Fertilizer work done by the Department for the past 20 years has helped to develop a nitrogen industry adequate to meet the country's requirements for peace-time industry and for national defense, to foster a domestic potash industry which guarantees the United States against future shortage and foreign monopoly, to improve the production of phosphate and mixed fertilizer, and to save the American farmer more than \$30,000,000 annually.

An idea of the extent to which the farmer has profited as a result of reduced costs of fertilizers may be gained from a comparison of the costs per unit of plant food in various materials shown in table 1.

TABLE 1.—Average spot prices per unit of 20 pounds of plant food in various materials at producing points, in stated years

Material	Plant food	1920	1925	1930	1933
Sodium nitrate.....	Nitrogen.....	\$4.44	\$3.28	\$2.49	\$1.53
Ammonium sulphate.....	do.....	4.08	2.65	1.79	1.12
Anhydrous ammonia.....	do.....		1.75	1.40	1.15
Cyanamid.....	do.....	3.40	2.20	1.65	1.13
Animal tankage.....	do.....	8.38	3.98	3.78	2.02
Fish scrap.....	do.....	8.02	5.33	4.95	2.88
Dried blood.....	do.....	8.97	4.53	4.27	2.63
Cottonseed meal.....	do.....	9.48	5.69	5.01	2.71
Run-of-pile superphosphate.....	Phosphoric acid.....	1.22	.57	.54	.43
Potassium chloride.....	Potash.....	2.41	.68	.69	.70

That the American potash industry has become so firmly established as to free this country from foreign control was demonstrated by its initiation this year of a series of price reductions which brought the cost of muriate of potash to the lowest price at which it had ever been quoted in this country, namely, 35.2 cents per unit of potash.

The utilization of synthetic ammonia in its application to the fabrication of new nitrogenous fertilizers has been studied with a view to the elaboration of substitutes for the high-priced organic ingredients and to promote the use of nitric acid in fertilizer manufacture.

The blast-furnace smelting of natural phosphate rock as developed by this Department yields the element, phosphorus, freed from its combinations, as a convenient material for distribution and fabrication into a series of fertilizer compounds. The Department's equipment and personnel applied to this important research has been transferred to the Tennessee Valley Authority to constitute a part of that agency's fertilizer-production program. Collateral researches involving smaller expenditures continue in the Department.

The application of this new technology to the vast phosphate deposits of the Rocky Mountain States appears to be the most feasible method of placing those deposits at the service of the farmers of the Midwestern and Western States. Utilization of these deposits would furnish much employment.

The Department continues to seek the elimination of the less valuable, with increased concentration of the more valuable, constituents of prepared fertilizers. Results to date, with a 40-percent increase in plant-food content, represent a proportionate decrease in distribution and handling charges amounting to an annual saving of several million dollars.

The Soil Survey

During the past fiscal year the Soil Survey mapped approximately 24,000 square miles of rural lands in 26 States and Puerto Rico. This brought the total area covered to more than 11½ million square miles, or something over one-half of the nonmountainous land of the Nation. In addition the Soil Survey aided other Government agencies in dealing with problems of land use, reclamation, and farm credit. The maps of the Soil Survey furnish a basis for developing policies of land use. With the accompanying reports, these maps provide working handbooks which describe conditions of climate, vegetation, physiography, geology, and drainage, and indicate the possible uses and productivity of particular areas.

In recent years the Soil Survey Division has cooperated with the North Dakota Agricultural Experiment Station in surveying the western counties of North Dakota for a classification of rural lands for tax assessments. Other States, especially Washington, plan a similar land classification. Appraisers for the Federal land banks use the soil maps. In areas surveyed recently the land appraisers rely almost exclusively on the soil survey. Organizations responsible for the determination of land use, the zoning of rural lands, the appraisal of farm lands, the purchase of lands for farms or forests, and the location of reclamation projects depend on the Soil Survey maps and reports.

Soil Erosion

It is imperative to emphasize the serious problem of soil erosion. Inattention to the progressive devastation of great areas by the uncontrolled action of wind and water already has cost the Nation many billions. In terms of our national life and welfare, the loss

cannot be expressed in dollars and cents. The Department has made progress in both the research and the extension phases of erosion control at its erosion control experiment stations. The remarkable effectiveness of vegetation in holding the soil in place has been measured in numerous ways under a wide variety of conditions. Associated studies have dealt with the comparative influence of different crops, the effects of cultivation, the value and action of organic matter in the soil, the make-up and arrangement of crop rotations, etc. The same cultivated crop may provoke remarkably different degrees of erosion in different rotations, depending on definite factors in the character and sequence of the other crops.

New and promising possibilities are developing through the combination of the vegetation factor with terracing, contour cultivation, and other mechanical types of control, especially under conditions of land use and slope where either alone may prove inadequate. Most promise under a rather wide range of conditions appears to lie in such combinations of methods.

Tests at the erosion experiment farms continue to demonstrate that terracing is the most effective single means of controlling soil erosion on cultivated land. It is particularly effective on land devoted to such crops as corn and cotton. Supplementing the terraces with contour plowing and the use of soil-saving and soil-building crops gives the best results. The experience of the Civilian Conservation Corps in gully control showed that for lands suitable only for pasture or forest, masonry or concrete structures are too costly. For such lands, less permanent dams of brush and logs or rock are practical.

EXTENSION AND INFORMATION WORK

All phases of the Department's traditional job of diffusing useful information on subjects connected with agriculture took on new meaning and vitality during the year. Through extension activities, press and radio releases, and through official publications the Department forwarded the crop-adjustment programs, and kept farmers and others in touch with technical progress in agricultural economics, in plant and animal science, in disease and pest control, in home economics, and in many other subjects of practical importance. It dealt comprehensively with all phases of the drought problem, from the meteorological aspects to the economic and social effects immediate and prospective. It specially emphasized the importance of erosion control and soil building through the increased use of pasture and forage, a course which has the additional great advantage of harmonizing with the crop-adjustment programs. Research and technical progress do not conflict with the need to readjust production, as many farmers and others mistakenly suppose; and the Department took pains to make this clear through various informational channels.

With the passage of the Agricultural Adjustment Act, the Extension Service became the spearhead of the adjustment campaigns. State extension workers and county agricultural agents in most of the States devoted much of their time to the organization and training of county and community crop-adjustment committees, and to holding meetings of farmers to explain the need for production control and the provisions of the production-control contracts. They

assisted farmers in executing contracts, supervised the measuring of fields to determine compliance, distributed checks for benefit and acreage-rental payments, and handled many other details involved in the contracts. Extension agents held nearly 75,000 meetings of farmers during the year in connection with production-control campaigns.

Extension workers everywhere assisted relief agencies, both in planning relief activities, and in suggesting to farm families means of increasing their incomes and keeping off relief rolls. Home-demonstration agents organized and directed home-gardening and food-preservation projects, supervised community-canning plants, and made suggestions regarding low-cost foods to maintain satisfactory dietary standards. Extension nutrition workers in a number of States served as advisers to State relief administrations on food problems.

The drought brought many new duties to extension workers. Local arrangements for the appraisal and purchase of several million cattle and sheep in the drought area by the Agricultural Adjustment Administration were, for the most part, in the hands of extension agents. Extension directors generally served as State drought directors and county agricultural agents as county drought directors. State drought directors assigned purchase quotas of cattle and sheep to counties, and county agents, with the assistance of the county drought service committees, arranged for the listing of livestock for purchase. Extension agents advised farmers regarding the conservation of feed supplies, the planting and use of emergency forage crops, the planting of emergency gardens, and many other means of lessening the ravages of the drought.

Boys and Girls 4-H Clubs

Both agricultural and home demonstration agents found time to continue in large measure one of the most important of extension activities, the 4-H boys' and girls' clubs. Enrollment in 4-H clubs and completion of projects by club members in 1933 reached practically the 1932 figures, and preliminary estimates for 1934 indicate that there has been little falling off in club work.

With the additional personnel employed as emergency agricultural agents and in other capacities through allotments of funds by the Agricultural Adjustment Administration, and with assistance given by the relief administration in some States in the employment of home demonstration agents, the extension staff now consists of a larger force of trained workers than at any previous time. On June 30, 1934, the total was 6,549, of whom 3,344 were agricultural agents and assistant agents in counties, and 1,387 were county home demonstration agents and assistants.

FARM HOUSING

With funds provided by the Civil Works Administration, the Department conducted a farm-housing survey as part of the farm-recovery program. The inconvenience of farmhouses, the absence of comforts which are taken as a matter of course in the city, and the wide-spread lack of even simple facilities for safeguarding health

are well known. Years of economic depression have intensified these conditions and lowered the standard of living among farm people. An improvement in rural housing would benefit the entire Nation. It would raise the rural living standard, furnish employment in many industries, and quicken trade in both town and country.

The survey covered farmhouses representative of conditions the country over. Its purpose was threefold: (1) To obtain definite facts and figures on rural-housing needs from the men and women occupants; (2) to work out plans and specifications for building new low-cost rural houses, and for making repairs and improvements on houses now standing; and (3) to suggest methods of financing that would aid in rural improvement and national economic recovery.

As an immediate relief measure the project gave employment to nearly 5,000 persons, among them about 4,500 women. The personnel included women trained in home economics, agricultural engineers and architects, and persons with statistical, clerical, and field experience. Bureaus of the Department cooperated with State extension services in the survey.

The field staff visited more than 600,000 farm homes in 352 counties in 46 States and obtained information regarding water supply and sewage disposal, light and heat, refrigeration, laundry, and cooking facilities, and on new installations and construction and acceptable methods of financing. An engineer in each county obtained data on needed repairs, and worked up a schedule of unit costs after interviewing local dealers, contractors, and farmers.

The survey indicated that probably 50 percent of our rural homes are in good structural condition. They may be poorly arranged, and may lack modern conveniences, but at least the houses are reasonably sound. On the other hand, some 15 percent of the houses need new foundations; between 15 and 20 percent need new roofs; 10 to 15 percent need new floors; and about 10 percent need extensive repairs or replacement of exterior walls. Between the extremes of houses in good condition and those needing complete replacement of some part or all of the house is a large group needing extensive repairs of some kind, including refinishing inside and painting outside.

Prospects for Farm Building

The survey indicated that 250,000 farmers hope to build new houses within the next 3 years, and that a much larger number wish to remodel their houses and add modern conveniences when their incomes permit. To assist farm people in planning improvements the Bureaus of Agricultural Engineering and Home Economics cooperated with 20 of the State agricultural colleges and the Civil Works Administration in preparing designs for well-arranged low-cost farmhouses. Forty of these plans have been published in a farmers' bulletin entitled "Farmhouse Plans." Working drawings to be used by carpenters in building these houses were made available through the extension services of the State agricultural colleges.

Studies were made of kitchen arrangement, storage units, and farmhouse remodeling. Suggestions are being prepared for remodeling old houses and making repairs. Specifications were prepared for plumbing and heating equipment suitable for farm use.

The survey stimulated a renewed interest in home improvement. There is an increasing demand for material on all phases of the subject. The survey showed that a large number of farm people want electric service. Accordingly, investigators studied present electric-service facilities, desirable extensions of transmission lines, and uses for electricity on farms. Other phases of the survey provided information on rural hospital and library facilities. In short, it furnished much basic information needed in planning for improved living conditions on farms.

Lack of Conveniences on the Farm

The survey revealed an extreme lack of home comforts and conveniences on the farm. Some of the causes were obvious. Rural communities find it difficult to cooperate in supplying utilities such as water supply and sewage disposal. Rural electrification is costly. Moreover, farm people frequently do things in laborious ways after easier methods have been discovered. In far too many instances the farmhouse provides only meager facilities for sheltering and feeding the farm family. It contributes little toward making homelife pleasant. Heretofore farm savings have largely gone back into the farm to increase production. It would be sound economy to put an increased proportion into the home. Such a course, besides raising the farm standard of living, would harmonize with the need for controlling production.

WEATHER STUDIES

During the past year the Weather Bureau took steps to utilize the results of recent studies and investigations in forecasting. This action was prompted, in part, by recommendations contained in a report by a committee of the Science Advisory Board. The committee was created by Executive order on July 31, 1933, for the purpose of cooperating with the Federal Government in the handling of problems in which science is involved. A special committee on the Weather Bureau consisted of Robert A. Millikan, director, Normal Bridge Laboratory of Physics and chairman of the executive council, California Institute of Technology, Pasadena, Calif., chairman; Isaiah Bowman, chairman National Research Council, director, American Geographical Society, New York City; Karl T. Compton, president Massachusetts Institute of Technology, Cambridge, Mass.; and Charles D. Reed, senior meteorologist in charge, Weather Bureau section center, Des Moines, Iowa. The committee's report was published in December 1933, was approved in January 1934, and action to carry out its recommendations has been proceeding since that time.

The most important recommendation related to the development of forecasting on the basis of what is known as "air-mass analysis." Briefly stated, air-mass analysis consists of a detailed study of masses of air of decidedly different structure as to temperature, moisture, and wind that meet along an irregular line variously referred to as a "discontinuity line", "polar front", "wind shift", etc. These masses of air, cold and dry from polar regions, warm and humid

from equatorial, do not readily mix but tend to preserve their individual identities, the warm, moist air being forced to rise above and flow over the denser cold air, with resulting condensation and precipitation and other attendant phenomena which give us most of the stormy weather characteristic of temperate latitudes.

The chief requisites for the application of air-mass analysis to forecasting are (1) personnel qualified by training and experience in this school of thought; (2) daily reports of temperature, humidity, and other conditions up to 3 or 4 miles above the earth's surface at a large number of places well distributed over the country; and (3) more frequent and more detailed reports of surface conditions, including observations at sea.

In carrying out the first objective a special nonassembled civil-service examination has been announced for the purpose of bringing into the Bureau several well-qualified men who have specialized in forecasting based on air-mass analysis. The introduction of this method will require probably from 3 to 5 years, during which period the personnel of the Bureau, already experienced in forecasting, will be given additional training along the newer lines.

The second part of the program, namely, securing upper-air observations of temperature, humidity, etc., has been put into effect to the extent that this is possible at the present time. This has been accomplished through cooperation with the War and Navy Departments. In all, 20 airplane stations are now in operation, 7 each by those two Departments and 6 by the Weather Bureau. These are quite well distributed over the country. Daily flights are made to heights of about 17,000 feet and the data are at once transmitted by the teletype system of the Bureau of Air Commerce. The organization of this net work of upper-air stations constitutes the most important step in the development of the air-mass analysis program. The data will be of great value in theoretical studies as well as in the more practical work of forecasting.

Under existing conditions not much can be done in putting into effect the third objective, namely, securing more frequent and more detailed observations of surface conditions, both on the land and at sea. However, a definite program has been worked out for adoption as soon as practicable. It provides for 4 daily weather maps instead of 2 and for more precise information regarding cloud types, character of precipitation, pressure changes, and other elements. The data will be reported in accordance with a system of codes and units that has been adopted for international use, thus assuring comparable reports from all countries.

Problems of Forecasting

Generally speaking, there has been comparatively little progress in forecasting for many years. It is confidently believed that, through the greater employment of modern working tools such as radio and the airplane, which will give us essential data in the vertical as well as in the horizontal, we now stand on the threshold of an era of real progress, which will provide forecasts more accurate, more specific, and covering somewhat greater periods in advance than have been possible up to the present time.

With funds allotted for the purpose by the Civil Works Administration this Department studied the frequencies at which excessive rainfall for short periods has occurred in different parts of the country. Results of this study should have numerous important practical applications. They have a bearing on the planning of terracing systems, on farm-drainage systems carrying surface water, on the construction of culvert-waterway openings for small watersheds, and on the need for municipal storm-water sewers and other structures for carrying run-off water. Knowledge of the frequencies with which different rates of precipitation recur will enable engineers to determine the maximum rates against which run-off structures should give protection. The study assembled data relating to excessive precipitations at 208 Weather Bureau stations. The investigators derived formulas to represent the maximum rates of precipitation for periods up to 400 minutes. They prepared charts showing the frequency, the duration, and the season of various precipitations. It should now be possible to predict with reasonable accuracy the probable frequency of short-duration precipitations of any given intensity in any part of the United States. Storms along the Gulf of Mexico and the Atlantic seaboard are of much greater intensity than storms inland east of the one hundredth meridian. West of that meridian storms are of less intensity and frequency than farther east.

ROAD CONSTRUCTION

To provide for emergency construction of public highways and related projects, the National Industrial Recovery Act authorized the President to make grants to the several State highway departments in an amount not less than \$400,000,000 to be expended on sections of the Federal-aid highway system, extensions of the Federal-aid system into and through municipalities, and secondary or feeder roads to be agreed upon by the State highway departments and the Secretary of Agriculture. An additional amount not less than \$50,000,000 was authorized for the construction of roads in the national forests and parks, in Indian reservations, and through public lands.

Under the latter authorization, \$25,000,000 was allotted to this Department for the construction of roads in the national forests, and \$5,000,000 was made available and apportioned among States having more than 5 percent of their area in public lands for construction of roads through such lands under the joint supervision of the Department and the several State highway departments. For the expenditure of these sums and the \$400,000,000 allotted for construction on the Federal-aid system and secondary roads, the Department has been directly responsible. Under special agreements the Bureau of Public Roads has also supervised the design and construction of roads in the national parks and loan-and-grant projects approved by the Public Works Administration.

Increase of employment was the primary purpose of these allotments, and the results in that respect have been satisfactory. Measured in man-months, the employment afforded by road construction

work, under the supervision of the Department, in the fiscal year 1934, was almost as great as the total for the 2 preceding years.

As shown by table 2, employment provided during the past year totaled 2,185,259 man-months, which may be compared with 908,271 man-months in the fiscal year 1932 and 1,352,626 in 1933. The 1934 employment varied from a minimum of 111,307 men in August 1933 to a maximum of 344,421 in June 1934, with an average monthly employment of 182,105 men.

TABLE 2.—*Comparison of employment during fiscal years 1932, 1933, and 1934 on all Federal and Federal-aid highway and forest road and trail construction, and on all Federal and State road work, including State maintenance operations, by months*

Month	Men employed on all Federal, Federal-aid highway, and forest road and trail construction			Total men employed on all Federal and State highway and forest road and trail construction and maintenance		
	1932	1933	1934	1932	1933	1934
	<i>Man-months</i>	<i>Man-months</i>	<i>Man-months</i>	<i>Man-months</i>	<i>Man-months</i>	<i>Man-months</i>
July.....	170,644	83,795	129,205	391,285	308,125	332,277
August.....	156,874	92,426	111,307	395,405	336,483	329,909
September.....	120,289	126,346	118,555	360,806	378,558	341,481
October.....	92,039	128,324	160,190	333,274	377,464	390,203
November.....	64,693	134,360	193,613	291,543	376,094	427,822
December.....	37,293	101,284	182,004	246,273	293,478	369,677
January.....	30,583	78,153	159,304	230,254	269,098	321,139
February.....	27,637	80,881	162,332	219,182	257,922	311,608
March.....	29,017	98,584	149,474	212,558	282,093	301,686
April.....	43,728	126,419	194,554	247,366	304,045	352,175
May.....	61,114	144,591	280,300	261,721	334,898	474,832
June.....	74,360	157,463	344,421	283,224	364,792	553,020
Total.....	908,271	1,352,626	2,185,259	3,472,891	3,883,050	4,505,829

These figures represent continuous employment—not individuals employed. By reason of the limitation of hours per week the number of individuals benefited is greater than the above figures indicate, the monthly average being about 261,000 persons. The figures represent direct employment only. The manufacture and transportation of materials and equipment employed an additional large number of men, estimated at 1.4 times the direct employment, or, for the year, approximately 3,059,300 man-months, making the total estimated employment, direct and indirect, during the year approximately 5,245,000 man-months.

The table gives details of the direct continuous employment by months in the fiscal years 1932, 1933, and 1934, on all Federal and Federal-aid road work supervised by the Department in comparison with the corresponding employment afforded by all Federal and State road construction and maintenance work. It will be noted that the employment provided by the Federal road work increased from approximately one-fourth of the total State and Federal employment in 1932 to nearly one-half of the total in the fiscal year 1934.

Distribution of Road-Building Employment

To distribute the road-building employment as widely as practicable the rules and regulations, issued by the Department with

the approval of the Special Board for Public Works, required that projects be located in at least 75 percent of all counties in each State. In the course of the year projects were actually initiated in 2,649 of the 3,074 counties of the United States, or 86 percent. In harmony with the requirements for other Public Works projects, the regulations also limited the working time of each individual to 30 hours per week, subject to exceptions consistent with the nature of the work; provided for the establishment of minimum wage rates by the several State highway departments, and stipulated certain reasonable preferences to apply in the employment of labor secured through local employment agencies designated by the United States Employment Service. Provision was also made to give effect to the purpose of the act to use a maximum of human labor in lieu of machinery wherever practicable and consistent with sound economy and public advantage.

In addition to funds provided by the National Industrial Recovery Act there were available for road building at the beginning of the fiscal year unexpended balances of previous appropriations for Federal-aid and emergency road construction and for forest and public-lands highways, for which this Department is directly responsible, in the amount of \$133,271,408. With the \$424,000,000 made available by the National Industrial Recovery Act for construction of Federal-aid, national-forest, public-lands, and secondary highways, the total available for expenditure at the beginning of the year was \$557,271,408.

Expenditures for Road Construction

Expenditures on the various classes of work for which the above sums were available amounted during the year to approximately \$243,821,700, including \$42,291,900 of Federal-aid funds, \$55,669,100 of emergency construction funds appropriated by the act of July 21, 1932, \$123,754,300 of public-works funds appropriated by section 204 of the National Industrial Recovery Act, \$12,744,300 of several funds available for forest-highway construction, \$7,064,600 for forest truck trails and trails, and \$2,297,500 from funds available for the construction of roads through public lands. The expenditure reported does not include \$35,275,000 disbursed to State highway departments in advance payment for work authorized by section 204 of the National Industrial Recovery Act, or expenditures made by States for work completed on public-works projects, probably exceeding \$100,000,000, for which reimbursement had not been made by the Federal Government on June 30. Nor do the reported expenditures include any sums paid for work done on national-park highways under the engineering supervision of the Bureau of Public Roads or for loan-and-grant highway projects approved by the Public Works Administration and also placed under the supervision of the Bureau of Public Roads.

Construction work on projects of various classes, covering 23,150 miles of road, 12,080 miles of truck tracks, and 2,525 miles of trails, was completed during the fiscal year; including 14,780 miles im-

proved with Federal-aid and emergency-construction funds, 6,986 miles built with funds appropriated by section 204 of the National Industrial Recovery Act, 1,099 miles of forest highways, 12,080 miles of truck trails, and 2,525 miles of trails, and 285 miles of public-lands highways. The total cost of the completed projects was \$340,963,082, exclusive of the emergency conservation funds.

At the close of the year the current program involved improvement of an additional 18,298 miles in all classes of projects, including 2,324 miles to be paid for with regular Federal-aid, State, and emergency-construction funds, 15,392 miles financed with section 204 funds, 1,646 miles of forest-highway projects, and 579 miles of public-lands highways, 1,700 miles of truck trails, and 1,300 miles of trails. The estimated cost of these projects is \$510,384,274. The above does not include contemplated work of the C. C. C.

These mileages and costs of projects completed and in progress do not include national-park road projects or loan-and-grant projects approved by the Public Works Administration on which the construction work is supervised by the Bureau of Public Roads. Nor do they include work-relief projects in progress, involving nearly 7,800 miles of road on which labor is supplied and paid by the Federal Emergency Relief Administration and other costs paid with Public Works funds.

CHANGES IN DEPARTMENT'S ORGANIZATION

Some important changes were made during the year in the organization of the Department. The position of Under Secretary of Agriculture was created. The position of Director of Scientific Work was discontinued. An Office of Budget and Finance was created, with a director in charge. The Bureau of Entomology and the Plant Quarantine and Control Administration were merged into a Bureau of Entomology and Plant Quarantine. To this were transferred several units in the Bureau of Plant Industry which deal with the control and prevention of the spread of plant diseases. Charles L. Marlatt, Chief of the Bureau of Entomology, retired after 44 years of service; William A. Taylor, Chief of the Bureau of Plant Industry, after 42 years of service; Beverly T. Galloway, principal pathologist and formerly Chief of the Bureau of Plant Industry, after 46 years of service; and James A. Evans, associate chief, Office of Cooperative Extension Work, after 29 years of service.

HENRY A. WALLACE,
Secretary of Agriculture.

FINANCIAL STATEMENT

Appropriations, Department of Agriculture, Fiscal Years 1932, 1933, 1934, and 1935

For the Department's regular budget for the year ending June 30, 1935, exclusive of Federal aid to States for experiment stations, extension work, and cooperative forestry activities, and exclusive of regular road funds, Congress appropriated \$49,407,907. This figure compares with total appropriations of \$57,435,245 for like purposes during the fiscal year 1934. It is a reduction of about 36 percent below 1932 appropriations for comparable items. A comparison of the regular funds for 1935 with similar appropriations for 1932, 1933, and 1934 is shown in table 1.

TABLE 1.—*Appropriations of Department of Agriculture under its regular budget, fiscal years 1932, 1933, 1934, and 1935*

Group and bureau unit	1932	1933	1934	1935
Ordinary activities:				
Office of the Secretary.....	\$1,322,115	\$1,206,547	\$1,181,857	\$755,193
Office of Information.....	1,420,961	1,335,800	1,226,287	951,207
Library.....	110,620	106,100	100,223	91,312
Office of Experiment Stations.....	399,410	294,294	226,961	212,324
Extension Service.....	1,793,560	1,688,170	1,583,822	853,311
Weather Bureau.....	4,497,720	4,164,038	3,731,235	3,163,869
Bureau of Animal Industry.....	16,085,195	15,324,947	14,398,524	12,284,165
Bureau of Dairy Industry.....	796,990	717,448	655,130	584,267
Bureau of Plant Industry.....	4,889,921	4,268,974	3,884,222	3,644,575
Forest Service.....	15,184,620	10,780,924	9,952,610	7,345,441
Bureau of Chemistry and Soils.....	2,104,051	1,925,080	1,766,458	1,468,725
Bureau of Entomology and Plant Quarantine ¹	7,560,987	5,623,725	4,984,415	3,289,581
Bureau of Biological Survey.....	2,229,170	1,756,177	1,356,280	1,848,933
Bureau of Agricultural Engineering.....	656,990	618,690	508,206	455,259
Bureau of Agricultural Economics.....	7,426,045	6,813,350	6,232,793	5,347,430
Bureau of Home Economics.....	246,700	233,365	212,749	187,953
Grain Futures Administration.....	221,480	218,838	200,000	188,000
Food and Drug Administration.....	1,810,228	1,716,167	1,589,505	1,626,564
Total.....	68,756,763	58,792,634	53,791,187	44,298,114
Special items:				
Forest-fire deficiency.....	4,260,000	1,000,000	(-)	(³)
Chinch-bug control.....			⁴ 1,000,000	
Grasshopper control.....				⁵ 2,354,893
Total.....	4,260,000	1,000,000	1,000,000	2,354,893
Forestry receipts and special funds.....	4,015,500	3,509,267	2,644,058	2,754,900
Total, Department regular budget, exclusive of payments to States and road funds.....	77,032,263	63,301,901	57,435,245	49,407,907

¹ Effective July 1, 1934, the Bureau of Entomology and Bureau of Plant Quarantine were merged and certain plant-disease control activities of the Bureau of Plant Industry were added thereto.

² \$412,000 made available from salaries and expenses, Forest Service, fiscal year 1934.

³ No appropriation yet provided for 1935.

⁴ Provided by act of June 7, 1934, and made available until Dec. 31, 1934; \$975,000 actually apportioned for 1934 and \$25,000 for 1935.

⁵ Provided by Agricultural Appropriation Act, 1935, and made immediately available; \$2,314,100 actually apportioned for 1934 and \$40,793 for 1935.

TABLE 1.—*Appropriations of Department of Agriculture under its regular budget, fiscal years 1932, 1933, 1934, and 1935—Continued*

Group and bureau unit	1932	1933	1934	1935
Payments to States (exclusive of national-forest receipt funds):				
Agricultural experiment stations.....	\$4,357,000	\$4,374,000	\$4,381,000	\$4,388,000
Extension work.....	8,672,936	8,728,096	8,738,096	8,748,096
Cooperative forest-fire prevention.....	1,775,000	1,611,580	1,587,513	1,573,619
Cooperative distribution of forest-planting stock.....	95,000	79,960	74,730	56,296
Total.....	14,899,936	14,793,636	14,781,339	14,766,011
Total, all regular funds except road funds.....	91,932,199	78,095,537	72,216,584	64,173,918
Road funds (regular):				
Federal-aid highways.....	⁶ 175,179,940	100,000,000	35,000,000	⁷ 8,000,000
Forest roads and trails.....	12,500,000	8,905,000	4,457,400	⁷ 1,500,000
Construction of roads at Monticello, Va.....				30,000
Total.....	187,679,940	108,905,000	39,457,400	⁸ 9,530,000
Grand total.....	279,612,139	187,000,537	111,673,984	⁸ 73,703,918

⁶ Including \$179,940, general expenses funds, for administrative expenses and highway research.

⁷ Actually apportioned in 1934.

⁸ Exclusive of \$100,000,000 for National Industrial Recovery Act highways, \$10,000,000 for forest roads and trails, and \$2,500,000 for public-land highways provided by the Emergency Appropriation Act, fiscal year 1935, listed under emergency funds (table 2).

Emergency Funds, 1933, 1934, and 1935

In addition to its regular budget, emergency funds aggregating \$1,131,873,418 were available for expenditure by the Department during the fiscal year 1934, and \$857,719,577 has been made available for the fiscal year 1935 (as of Oct. 15, 1934). These emergency funds include those for carrying out the purposes of the Agricultural Adjustment Act; Public Works allotments for road construction, physical improvements at the Department's field stations, control of certain plant diseases and insect pests, etc.; the supervisory and overhead costs incident to Civil Works projects, covering miscellaneous activities affecting many phases of the work of the Department of Agriculture carried out by Civil Works administrators in the various States; emergency conservation work authorized by the Emergency Conservation Act of March 31, 1933, and conducted under direct allotments to the Department of Agriculture; and emergency relief projects under allocations from special funds made available to the President for drought and other relief purposes. Emergency funds for the fiscal years 1933, 1934, and 1935 are listed in table 2.

TABLE 2.—*Emergency funds available to Department of Agriculture, fiscal years 1933, 1934, and 1935 (as of Oct. 15, 1934)*

Appropriation or allotment and project	1933	1934	1935
Road funds:			
Federal-aid highways.....	\$120,000,000	\$400,000,000	\$100,000,000
Forest roads and trails.....	10,000,000	25,100,000	10,000,000
Public-land highways.....	2,000,000	5,000,000	2,500,000
Special road grants to certain States.....		7,431,000	
Miscellaneous road projects.....		260,725	
Total.....	¹ 132,000,000	² 437,791,725	³ 112,500,000
Agricultural Adjustment Administration:			
Direct appropriation for administrative expenses, etc.		100,000,000	
Advances from Treasury for rental and benefit payments, removal of agricultural surpluses, and administration (reimbursable from processing taxes).....		490,385,000	434,862,980
Advances from Treasury for tax refunds by Bureau of Internal Revenue.....		19,500,000	48,107,260
Direct appropriations for carrying out provisions of secs. 2 and 6 of act of Apr. 7, 1934, for purchase of surplus cattle and beef and dairy products (including elimination of diseased cattle).....			150,000,000
Allotment under sec. 220, National Industrial Recovery Act, for corn-hog program (rental and benefit payments).....		37,000,000	
Allotments from National Industrial Recovery Act funds for administration of codes.....		250,000	316,000
Purchase of surplus beet sugar from proceeds of processing taxes.....			8,000,000
Advances from Treasury for administrative expenses, tax refunds, and other payments authorized by Tobacco Act of June 28, 1934.....			663,945
Total.....		647,135,000	⁴ 641,950,185
Public Works allotments:			
Physical improvements and control of tree-destroying diseases and insects and injurious rodents in the national forests.....		14,967,745	⁵ 1,041,418
Physical improvements at Department field stations and in District of Columbia.....		4,650,582	175,175
Special projects (control of plant diseases and insect pests, construction of erosion-control nurseries, purchase of land for National Arboretum, spray-residue investigations, etc.).....		5,408,036	707,799
Total.....		25,026,363	1,924,392
Civil Works projects (allotments to Department from Federal Civil Works Administration, principally for overhead expenses incident to work-relief projects prosecuted under direct expenditure by State Civil Works Administrations).....		⁶ 885,330	
Emergency Conservation Work (authorized by Emergency Conservation Act of Mar. 31, 1933):			
Acquisition of additional forest land.....		20,000,000	
Purchase and rental of lands for wildlife refuges.....		1,000,000	
Investigations by Bureau of Chemistry and Soils to determine the selenium content of soils in certain areas.....		35,000	
Total.....		⁷ 21,035,000	

¹ Emergency Relief and Construction Act of July 21, 1932.² Public Works allotments under National Industrial Recovery Act.³ Emergency Appropriation Act, 1935.⁴ Exclusive of \$100,000,000 made available to Secretary of Treasury by Emergency Appropriation Act, 1935, which may be advanced to Secretary of Agriculture for protection of title to cotton acquired under part 1 of the Agricultural Adjustment Act; includes funds transferred to other bureaus for work in furtherance of the agricultural-adjustment program.⁵ Includes \$41,418 for salary restoration authorized by act of Mar. 28, 1934.⁶ Approximately \$18,000,000 expended in 1934 by State civil works administrations on projects affecting activities of Department of Agriculture.⁷ Financed under direct allotments of National Industrial Recovery Act funds. In addition, approximately \$66,000,000 was allocated for Civilian Conservation Corps activities on national-forest and other lands; work under supervisory direction of Forest Service, but costs paid for by War Department from appropriations authorized by Emergency Conservation Act.

TABLE 2.—*Emergency funds available to Department of Agriculture—Continued*

Appropriation or allotment and project	1933	1934	1935
Emergency relief:			
Allocations from President's \$525,000,000 fund provided by Emergency Appropriation Act, 1935:			
For acquisition and disposition of seed, feed, and livestock			\$97,780,000
For encouraging and assisting the systematic planting and growing of trees, shrubs, etc., in the Plains area as a means of ameliorating drought conditions			1,000,000
For control of Japanese beetle infestation at St. Louis, Mo.			65,000
Allocation from President's \$899,675,000 fund provided by Emergency Appropriation Act, 1935, to be used for restoration, improvement, and development of areas for the conservation of migratory birds and other wildlife			2,500,000
Total			101,345,000
Grand total	\$132,000,000	\$1,131,873,418	857,719,577

Obligations, Department of Agriculture, Fiscal Year 1934

Obligations incurred under appropriations administered by the Department of Agriculture and under emergency funds allocated to the Department during the fiscal year ended June 30, 1934, totaled \$795,798,326. Of this amount, \$63,097,545 was for the regular continuing work of the Department (exclusive of road funds), \$246,015,356 for road construction, under regular as well as emergency funds, and \$486,685,425 for other emergency activities. The latter sum includes only money directly obligated by the Department, that is, is exclusive of funds which, though applied to Department activities, were actually disbursed by other governmental agencies. These figures are summarized in table 3.

TABLE 3.—*Summary of obligations, fiscal year 1934*

Group	Amount obligated	Percentage of total for—	
		Regular work (exclusive of road funds)	All items
Regular work (exclusive of road construction):	<i>Dollars</i>	<i>Percent</i>	<i>Percent</i>
Ordinary activities	42,574,587	67.5	5.3
Special items (forest-fire deficiency, grasshopper control, and chinch-bug control)	3,644,500	5.8	.5
Forestry receipts, contributed, and other special funds (including \$679,317 paid to States from national-forest receipts)	2,256,539	3.6	.3
Payments to States for support of agricultural experiment stations, extension work, and cooperative forestry activities, including fire prevention	14,621,919	23.1	1.8
Total	63,097,545	100.0	7.9
Road construction (including \$207,431,000 apportioned to States for Federal highways)	246,015,356		30.9
Emergency items, exclusive of road funds:			
Agricultural Adjustment Administration	456,903,584		57.5
Public Works allotments	14,617,747		1.9
Civil Works projects	610,643		
Emergency Conservation Work	14,553,451		1.8
Total	486,685,425		61.2
Grand total	1 795,798,326		100.0

¹ This figure, which represents the total amount obligated during the fiscal year 1934, compares with actual Treasury cash withdrawals of \$692,308,166 on account of the Department of Agriculture, as shown in the statement of classified receipts and expenditures of the Government for the period from July 1, 1933, to June 30, 1934, issued by the Treasury Department on July 15, 1934.

The total of \$795,798,326 obligated by the Department during the fiscal year 1934 was distributed by organization units and by types of activity as indicated by tables 4 and 5.

TABLE 4.—*Obligations, fiscal year 1934, classified by organization units*

REGULAR FUNDS, EXCLUSIVE OF ROAD FUNDS

Organization unit	Amount obligated
Ordinary activities:	
Office of the Secretary.....	¹ \$995,651
Office of Information.....	² 998,306
Library.....	87,551
Office of Experiment Stations.....	196,879
Extension Service.....	³ 1,184,045
Weather Bureau.....	2,957,822
Bureau of Animal Industry.....	⁴ 11,343,362
Bureau of Dairy Industry.....	540,864
Bureau of Plant Industry.....	3,645,807
Forest Service.....	⁵ 7,768,778
Bureau of Chemistry and Soils.....	1,473,002
Bureau of Entomology and Plant Quarantine ⁶	⁷ 3,311,822
Bureau of Biological Survey.....	1,057,235
Bureau of Public Roads.....	⁸ 1,200
Bureau of Agricultural Engineering.....	424,125
Bureau of Agricultural Economics.....	4,750,824
Bureau of Home Economics.....	171,516
Grain Futures Administration.....	167,289
Food and Drug Administration.....	1,498,509
Total.....	42,574,587
Special items:	
Forest-fire deficiency (Forest Service).....	380,799
Grasshopper control (Bureau of Entomology and Plant Quarantine).....	2,293,701
Chinch-bug control (Bureau of Entomology and Plant Quarantine).....	970,000
Total.....	3,644,500
Forestry receipts and special funds (Forest Service).....	⁹ 2,256,539
Total, all foregoing items.....	48,475,626
Payments to States (exclusive of road funds and national-forest receipt funds):	
Agricultural experiment stations (Office of Experiment Stations).....	4,361,000
Extension work (Extension Service).....	8,678,096
Cooperative forest-fire prevention (Forest Service).....	1,529,890
Cooperative distribution of forest planting stock (Forest Service).....	52,933
Total.....	14,621,919
Total, exclusive of road funds.....	63,097,545

¹ Obligations charged to Office of the Secretary include the offices of Secretary, Under Secretary, and Assistant Secretary and general supervisory officials such as Directors of Extension Work, of Personnel, and of Finance; also the following organization units which serve the Department as a whole: Divisions of Appointments; Accounts; Purchase, Sales, and Traffic; Operation; and Estimates and Reports; inspection, personnel classification, mails and files, telephone and telegraph, post office, motor transport, rent in the District of Columbia, and the cost of the Office of the Solicitor which handles the legal work of the Department. The total obligated for 1934 includes \$237,178 transferred to the Interior Department for building guarding, cleaning, and maintenance work, and \$6,323 transferred to the disbursing division of the Treasury Department.

² Includes \$685,466 for the job printing, publication, and binding requirements of the entire Department.

³ Includes \$724,838 contributed from Department funds toward salaries of field extension agents, supplementing direct Federal-aid payments to States under the Smith-Lever, Capper-Ketcham, and other extension acts.

⁴ Of this amount \$3,900,814 was obligated for tuberculosis eradication, including \$2,900,814 paid as indemnities to livestock owners on account of animals destroyed; and \$4,530,795 was for meat inspection.

⁵ Exclusive of \$380,799 for forest-fire deficiency (included under Special Items).

⁶ See footnote 1 to table 1.

⁷ Exclusive of \$3,263,701 for grasshopper and chinch-bug control (included under Special Items).

⁸ Balance on construction of buildings at Alameda, Calif.

⁹ Includes \$679,317 paid to States from national-forest receipts.

TABLE 4.—*Obligations, fiscal year 1934, classified by organization units—Continued*

ROAD AND EMERGENCY FUNDS

Organization unit	Amount obligated
Road construction (regular and emergency funds).....	¹⁰ \$246,015,356
Agricultural Adjustment Administration.....	456,903,584
Public Works allotments (exclusive of road funds).....	14,617,747
Civil Works projects.....	610,643
Emergency Conservation Work.....	14,553,451
Total.....	¹¹ 732,700,781
Grand total.....	795,798,326

¹⁰ Includes \$207,431,000 apportioned to States (\$200,000,000 under Hayden-Cartwright Act of June 18, 1934, and \$7,431,000 under special Public Works allotment authorized by National Industrial Recovery Act).

¹¹ For details, see statement Road and Emergency Funds, p. 117.

TABLE 5.—*Obligations, fiscal year 1934, classified by types of activity*

Type of activity	Ordinary activities and special items ¹		Payments to States ²	Forestry receipts and special funds	Total	
	<i>Dollars</i>	<i>Percent</i>	<i>Dollars</i>	<i>Dollars</i>	<i>Dollars</i>	<i>Percent</i>
Regular work (exclusive of road funds):						
Research.....	12,157,446	³ 26.3	⁴ 4,361,000	⁵ 11,140	⁶ 16,529,586	2.1
Extension.....	1,790,871	3.8	⁷ 8,678,096		10,468,967	1.3
Eradication or control of crop and animal pests.....	⁸ 10,393,733	22.5			10,393,733	1.3
Regulatory work.....	9,785,000	21.2			9,785,000	1.2
Public-service activities.....	12,092,037	26.2	⁹ 1,582,823	¹⁰ 2,245,399	15,920,259	2.0
Total.....	³ 46,219,087	100.0	14,621,919	¹⁰ 2,256,539	⁶ 63,097,545	7.9
Percentage of total for regular work.....	73.3		23.1	3.6	100.0	
Percentage of grand total.....	5.8		1.8	0.3	7.9	
Road and emergency funds:						
Road construction (regular and emergency funds).....			(11)		¹² 246,015,356	30.9
Agricultural Adjustment Administration.....					456,903,584	57.5
Public Works allotments (exclusive of road funds).....					14,617,747	1.9
Civil Works projects.....					610,643	
Emergency Conservation Work.....					¹³ 14,553,451	1.8
Total.....					¹⁴ 732,700,781	92.1
Grand total.....					795,798,326	100.0

¹ Including grasshopper and chinch-bug control.

² Exclusive of road funds and national-forest receipts funds paid to States.

³ 19.3 percent of total for regular work, and 1.5 percent of grand total.

⁴ Payments to State agricultural experiment stations and to Hawaii and Alaska under Hatch, Adams; and Purnell Acts.

⁵ For investigations under item Cooperative Work, Forest Service.

⁶ Exclusive of \$381,616 for highway research (included under total for road construction).

⁷ Payments to State agricultural colleges and to Hawaii and Alaska under Smith-Lever, Capper-Ketcham, and supplemental acts.

⁸ Includes special items of \$2,293,701 for grasshopper control and \$970,000 for chinch-bug control.

⁹ Consisting of \$1,529,800 paid to States for cooperative forest-fire prevention and \$52,933 for cooperative distribution of forest planting stock, under the Clarke-McNary Act.

¹⁰ Includes \$673,317 paid to States from national-forest receipts.

¹¹ \$207,431,000 apportioned to States for Federal-aid highways (included in total for road construction).

¹² Includes \$381,616 for highway research.

¹³ Includes \$14,535,173 obligated for acquisition of forest lands.

¹⁴ For details, see statement road and emergency funds, p. 117.

Road and Emergency Funds

(Analysis of obligations shown under this head in tables 4 and 5)

ROAD CONSTRUCTION

Federal-aid highways:

Regular Federal highway act funds:

Administrative expenses-----	\$661, 420	
Highway research-----	381, 616	
		\$1, 043, 036

Emergency funds (under provisions of National Industrial Recovery Act):

Administrative expenses (Public Works allotment, 1933-35)-----	1, 612, 172	
Apportionments to States (authorized by Hayden-Cartwright Act of June 18, 1934)-----	200, 000, 000	
Apportionments to certain States for work-relief highways (Public Works allotments, 1933-35)-----	7, 431, 000	
		209, 043, 172

Total-----		210, 086, 208
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Forest roads and trails:

Regular Federal Highway Act funds-----	5, 751, 471	
Emergency funds (Public Works allotments under National Industrial Recovery Act):		
National-forest highways-----	15, 000, 000	
National-forest roads, trails, bridges, and related projects-----	10, 100, 000	
		30, 851, 471

Public-land highways (emergency funds):

Emergency Construction Act of Dec. 20, 1930-----	19, 824	
Emergency Relief and Construction Act of July 21, 1932-----	14, 763	
Public Works allotment under National Industrial Recovery Act-----	4, 996, 909	
		5, 031, 496

Miscellaneous road projects (Public Works allotment under National Industrial Recovery Act)-----	11, 815	
Mount Vernon Memorial Highway-----	34, 307	
Flood-relief roads and bridges, Georgia and South Carolina-----	59	

Total, road construction-----		246, 015, 356
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AGRICULTURAL ADJUSTMENT ADMINISTRATION

General administrative expenses-----	2, 590, 150	
Rental and benefit payments to farmers for effectuating reduction in acreage or production for market, or both-----	387, 243, 058	
Removal of surplus agricultural products-----	64, 582, 948	
Tax refunds by Bureau of Internal Revenue in connection with administration of the Agricultural Adjustment Act-----	1, 374, 404	
Administration of National Industrial Recovery Act codes placed under jurisdiction of the Agricultural Adjustment Administration by Executive order-----	250, 000	
Purchase of surplus cattle and beef and dairy products for distribution for relief purposes-----	863, 024	
Total-----		1 456, 903, 584

¹ This is the total amount obligated for the fiscal year 1934. The actual expenditures were \$318,063,116. Proceeds from processing taxes available for 1934 aggregated \$371,422,885.

PUBLIC WORKS ALLOTMENTS (EXCLUSIVE OF ROAD FUNDS)

Under allotments made to the Department of Agriculture by the Federal Emergency Administration of Public Works from funds authorized by the National Industrial Recovery Act, the following obligations were incurred during 1934 for purposes other than road construction:

Miscellaneous funds:

Physical improvements and control of tree-destroying diseases and insects and injurious rodents in the national forests-----	\$8, 660, 549
Physical improvements at Department field stations and in the District of Columbia-----	2, 532, 144
Special projects, including control of plant disease and insect pests, construction of erosion-control nurseries, purchase of land for National Arboretum, spray-residue investigations, etc-----	3, 425, 054
Total (exclusive of road funds)-----	14, 617, 747

CIVIL WORKS PROJECTS

Under allotments made by the Federal Civil Works Administration, a total of approximately \$18,000,000 was expended during 1934 by Civil Works authorities in the various States for work-relief projects, covering a miscellaneous group of activities affecting many phases of the work of the Department of Agriculture, including statistical and economic studies, pest-control work, physical improvements, etc.

Amount obligated under direct allotments to Department for supervisory and other overhead expenses-----	\$610, 643
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EMERGENCY CONSERVATION WORK

(Authorized by Emergency Conservation Act of Mar. 31, 1933)

Obligations incurred under National Industrial Recovery Act funds transferred to Department of Agriculture for direct expenditure:	
Acquisition of additional forest land-----	\$14, 535, 173
Soil examinations, surveys, and investigations to determine selenium content of soils in certain areas-----	18, 278
Total (direct allotments)-----	14, 553, 451

In addition, Civilian Conservation Corps activities were conducted on national-forest and other lands, under the supervisory direction of the Forest Service, and certain special projects of other bureaus of the Department were performed by Civilian Conservation Corps enrollees. This work was not a direct charge against the Department of Agriculture, but was financed through the War Department under funds authorized by the Emergency Conservation Act. The budget schedules show the following obligations incurred thereunder during 1934:

Emergency Conservation Work:

National forests-----	\$27, 950, 491
Alaska-----	380, 481
State, municipal, and private lands-----	22, 417, 089
Oregon and California grant lands-----	318, 434
Puerto Rico-----	325, 448
Navy Department reservations-----	70, 078
Migratory-bird refuges-----	123, 826
Forest-disease and insect-control work-----	55, 300
Total-----	51, 641, 147

Income from Department's Activities

During the fiscal year 1934 receipts accruing incident to the ordinary operations of the Department (that is, exclusive of tax collections) totaled \$6,809,338, and judgments were recovered through fines imposed by the courts amounting to \$103,749 in connection with the enforcement by the Department of regulatory laws, as follows:

Receipts:

(1) Deposited to credit of miscellaneous receipts fund:

National-forest receipts:

Timber sales-----	\$1, 522, 356
Grazing fees-----	1, 358, 688
Other business on the national forests-----	433, 647
	<u>\$3, 314, 691</u>

Contributions from private cooperators, appropriated as a special fund (Cooperative Work, Forest Service) for various activities on the national forests and privately owned timberlands-----

1, 306, 354

From other sources-----

962, 059

2, 268, 413

5, 583, 104

(2) Deposited to credit of applicable funds of Department:

Fees for classifying cotton, deposited to credit of revolving fund for conducting that work--

28, 124

Reimbursement to various Department appropriations for expenditures made therefrom--

1, 198, 110

1, 226, 234

Total-----

6, 809, 338

Fines: Fines imposed under court judgments in connection with violations of statutes intrusted to Department for enforcement---

103, 749

Grand total-----

6, 913, 087

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REPORT OF THE CHIEF OF THE BUREAU OF AGRICULTURAL ECONOMICS, 1934

UNITED STATES DEPARTMENT OF AGRICULTURE,
BUREAU OF AGRICULTURAL ECONOMICS,
Washington, D.C., September 8, 1934.

SIR: I transmit herewith a report of the work of the Bureau of
Agricultural Economics for the fiscal year ended June 30, 1934.

Respectfully,

NILS A. OLSEN, *Chief.*

Hon. HENRY A. WALLACE,
Secretary of Agriculture.

The past year has been one of unusual effort in agriculture in which the Bureau of Agricultural Economics has played an important part. The continuing activities of the Bureau, however, have been carried forward with constantly growing public demand for economic information, although some curtailments were necessary under the economy program. These activities include fact-finding and analysis, disseminating information, administering specific laws, and conducting various services. The work covers the keeping of a never-ending record of the crops and animals—production, movement in trade, consumption. It includes the development of uniform grades and standards and marketing practices to promote more efficient distribution of farm products. It means providing the country with the daily and hourly news of supplies, prices, and markets; conducting research into the manifold economic problems of farm and market; acting as official umpire in respect to various phases of agricultural business which are affected with a public interest.

The Bureau's capacity as an economic research and service agency is well illustrated by its contribution to the Agricultural Adjustment Administration program. The present broad program of national planning in agriculture could not have been undertaken without the basic data on production and distribution which this organization has been assembling for years.

The staff of the Bureau, in Washington and in the States, has worked long hours assembling statistical facts, working out production quotas, speeding the necessary checking of contracts, and serving on the many boards and committees required to plan and execute so vast a program. Where the fact-finding agencies and personnel of the Bureau have been in a position to help in any part of the A.A.A. activities they have done so and in all respects have given their best efforts to make this program successful.

RELIEF AND DROUGHT-EMERGENCY WORK

The great drought of 1934 piled up an additional load of economic problems and added greatly to our work. The Bureau was ready to provide the groundwork of facts upon which the relief program could be based. Such emergency work of the past year is cited, not merely to report our activities under the law but to suggest the scope of this organization as a unit in national service.

An activity which has loomed large in the last year relates to the new trade negotiations with foreign countries. Together with the Department of State and other departments, the Bureau has had a part in laying the factual groundwork for such negotiations. It has been necessary to direct a large amount of statistical research into the possibilities of international trade and the extent of competition between domestic and foreign agricultural products.

During the past year a far-reaching revision of the grain standards was completed. The changes are designed more adequately to reflect variations in quality and thereby promote the payment of prices to growers according to the quality of grain produced. New standards were also added for certain grains, such as malting barley, flaxseed, and Mixed Grain.

Another outstanding development is in the field of grade and staple estimates for cotton. This service has been brought closer to the cotton farmer. A report was made to Congress in the closing days of the last session, which proposed an expanded program of classing all cotton for farmers and developing a market news service that would keep the cotton growers intimately in touch with current market developments.

A typical example of the new economic problems which are always arising is the increase in the direct marketing of hogs. The Bureau was called upon during the year to make a comprehensive study of the direct marketing of hogs, with a view to determining the effect of this system of marketing on hog prices to the farmer. This study is now nearly completed and a report will be available in the near future. It will present valuable information on this moot subject and make suggestions for improving the handling and marketing of hogs.

Other important developments in marketing include the growth of motor-truck distribution, large-scale retailing, and the extension of marketing agreements under the Agricultural Adjustment Act. The public questions involved in transportation, processing, and marketing in the light of these various new factors make it necessary to secure more adequate groundwork of fact than we now have. The Bureau has taken steps to initiate special research work in this field and is about to create a new division which will be devoted to research within this definite field of marketing.

Touching upon the Bureau's activities as related to the general economic situation of this past year, several Civil Works Administration projects were conducted which made possible the employment of several thousand people. On one project, involving the collection of data on tax delinquency and land transfers, 7,000,000 individual records were obtained that provided employment for about 7,800 persons under the direction of our staff. Some of the data obtained under this project, together with other information compiled by the Bureau on the farm-tax situation, were embodied in a report to Congress and published as House Document No. 406, Seventy-third Congress, second session.

CURRENT ECONOMIC INFORMATION

As a fact-finding and distributing agency the Bureau of Agricultural Economics has met its greatest opportunity during the year. The intense governmental activity has created a need for facts to be used as a basis for planning action and for adapting plans to changing conditions.

A.A.A. AND DROUGHT INCREASE THE USE OF CROP ESTIMATES

That accurate statistics of acreage and production of crops and numbers of livestock are indispensable to an intelligent agriculture has been frequently demonstrated this year. The official crop and livestock estimates of the Bureau have probably been more widely used by both governmental and private agencies than ever before. The demand has been for more detailed reports since the adjustment program called for estimates by counties. Some curtailment was necessary in the dairy, fruit, and vegetable reports, but in general the regular crop-reporting service for most crops was maintained on practically the same basis as during the previous year.

Difficult problems in crop estimating, created by the unprecedented drought which began early last spring, were met by special action. Development of special means to measure what has taken place, extensive travel, and many special surveys have been necessary, culminating in a comprehensive survey in June, July, August, and September, covering the entire country. A daily record of the spread of the drought was provided as a basis for the designation of emergency and secondary drought counties during a period of over 3 months.

Both the Washington staff and the field offices took an active part in such emergency activities as the corn-hog campaign, the 1934 cotton program of the Agricultural Adjustment Administration, in the fruit and vegetable work in the General Crops Section of the A.A.A., and in connection with marketing agreements covering various commodities. The Bureau's statisticians in prac-

tically all States assisted local boards of review which were set up to pass on and approve contracts before forwarding them to Washington. The Bureau provided the information upon which county quotas for corn, hogs, and cotton were established, and the field offices handled the tabulation of the contracts. Through a corps of traveling statisticians in each State assistance was given the counties in checking and correcting the contracts to bring them within the established quotas.

COTTON QUOTAS UNDER THE BANKHEAD LAW

After the passage of the Bankhead Act, the Bureau made a careful analysis of the ginnings by counties and suggested tentative county quotas for each State which, with some slight changes, have been adopted by the A.A.A. During the current year the State statisticians are acting as advisory consultants to the State cotton allotment boards and members of their staff are assisting in the tabulation and analysis of the applications of cotton producers for allotments under the act.

SPECIAL ESTIMATES AND REPORTS FOR THE A.A.A.

Chiefly as a result of the wheat and corn-hog programs of the A.A.A., the work on grain was greatly increased. County estimates of wheat acreage, yield, and production for each of the years 1928 to 1932 were prepared for the Wheat Section of that Administration. County estimates of corn acreage for 1932 and 1933 and of corn yields for 1924 to 1933 were prepared for the Corn and Hog Section. In addition there have been frequent calls for special information needed in connection with other adjustment programs.

The drought brought the need for frequent and detailed information concerning prospective grain production in various sections of the country.

Through cooperation with the General Crops Section of the A.A.A. which needed special information relating to fruits for use in connection with marketing agreements, arrangements were completed recently to increase the scope and number of fruit reports. Special surveys are being undertaken covering citrus fruits in California, Texas, and Florida, and pears on the Pacific coast.

FRUIT AND VEGETABLE REPORTS CURTAILED

It has been impossible to maintain even the program of basic reports of the fruit and vegetable crop as curtailed during the preceding fiscal year. Several additional reports for which there is a considerable demand were eliminated—the reports giving stocks of cabbage and onions on hand November 1, and the January 1 report on potato stocks and utilization. Other basic reports on fruits, vegetables, and canning crops have been maintained in spite of a decreased personnel and an increased demand from the Agricultural Adjustment Administration and other agencies for more detailed analyses of crop statistics and for supplemental information regarding restricted areas.

NEW DATA ON THE COUNTRY'S LIVESTOCK

Because of the emergency hog-reduction program conducted in September 1933 and the corn-hog reduction program inaugurated late in 1933, by the A.A.A., special identical comparisons were made to determine to what extent the statements on the pig-survey cards of December 1933 and June 1934 were influenced by these governmental activities. Data from the corn-hog program were available for use in preparing the June 1934 pig-crop report for the principal hog-producing States and the estimates were revised for some States, from 1930 to date, on the basis of this information.

Data relating to the amount and value of production of and income from hogs from 1930 to 1932 were revised. Continued research on the problem of reconciling the data on production and disappearance of livestock, leads to the expectation of making a final revision of these data by States, from 1924, within the next year.

Important additional check data obtained included (1) the number of hogs purchased direct by 125 Ohio packers; (2) the number of cattle, calves, and hogs purchased by about 25 Alabama packers; and (3) the State of origin of the wool handled by concerns doing business with governmental credit agencies as reported by the Wool and Mohair Advisory Committee.

In reviewing the indications of changes in numbers of livestock on farms January 1, 1934, these data were reviewed by species rather than by States for the first time.

ESTABLISHING COUNTY QUOTAS ON HOGS

Livestock statisticians prepared much livestock information directly for the A.A.A. and aided in establishing State and county hog quotas. One of the largest projects was the making, over a period of several months, of preliminary estimates of county hog production for all the important hog-producing counties for all States except the New England group, New York, New Jersey, Louisiana, Texas, New Mexico, Arizona, Utah, Nevada, and California.

DAIRY ESTIMATES LIMITED

Collection, analysis, and distribution of information relative to dairy production had to be curtailed in both the field and the Washington offices. The inquiry formerly sent monthly to a large list of dairymen and farmers was reduced to a quarterly basis, thus greatly limiting the information collected on trend of production, utilization of milk, rate of feeding, changes in numbers, changes in freshening dates, proportion of the cows milked, butterfat test, calves sucking, etc. Some questionnaires have been discontinued although the demand for the information thus gained has increased greatly.

GATHERING INFORMATION FROM FOREIGN COUNTRIES

Special investigations were made of foreign governmental activities in respect to marketing schemes and production-control programs. These activities were studied from the viewpoint of their effect on American agriculture and as examples of what other countries are doing to assist their farmers. Representatives of the Bureau's Foreign Agricultural Service played an active part in connection with the international wheat agreement signed in London in August 1933.

OTHER COUNTRIES CURTAILING LIVESTOCK SURPLUSES

In the completion of special field studies of plans for aiding livestock industries in Great Britain, Germany, Denmark, and the Netherlands, the probable effect of these plans on the export markets for American pork products was given particular attention. In general the deficit pork-producing countries are attempting to expand production and to reduce import requirements and surplus-producing countries are curtailing production as an adjustment to reduced foreign outlets. The curtailment programs have been far more successful than the expansion programs.

PROSPECTS FOR EXPORT MARKETS FOR AMERICAN PORK

Study of the German fat program leads to the conclusion that Germany cannot hope, with its existing resources, to become self-sufficient in fats without the greatest sacrifices in its general economy. Great Britain is experiencing such serious difficulties in its program for expansion of the hog industry that it seems extremely doubtful whether British production can be developed to the point at which it, together with supplies from Empire countries, will meet present demands of British consumers for pork products. Denmark, the principal source of cured pork for the British market, has greatly curtailed production to keep within home demand and the British quota. The Netherlands has effected considerable reduction in hog numbers but is having difficulty in bringing seasonal production to conform to the seasonal demand in restricted foreign markets. With a recovery in business conditions abroad it seems probable that American exports of pork products can be substantially increased from the low levels of the depression. Much will depend on the actions of deficit countries with respect to import restrictions but there is a sound basis for thinking that such restrictions can be substantially reduced through reciprocal trade agreements.

EUROPEAN MILLERS AND BAKERS PREFER AMERICAN WHEAT

An investigation of European-wheat consumption was concluded. There have been marked shifts in the sources of supply of bread grains in the

European countries, chiefly in the direction of increased consumption of domestic wheat from the large crops of 1932 and 1933 but the study brings the conclusion that with a return of world-wheat prices to a higher level, the long-standing preferences of millers and bakers for certain classes of overseas wheat will reassert themselves. Other things being equal, most European millers and bakers prefer to use Canadian-spring and American hard-winter wheats above all other types of wheat.

The spread between prices of bread and prices of wheat in several European countries is now being studied. These spreads have been consistently narrower in the foreign countries studied than those prevailing in the United States.

COTTON COMPETITION IN EGYPT, ANGLO-EGYPTIAN SUDAN, AND BRAZIL

Studies of cotton production in Egypt and the Anglo-Egyptian Sudan were completed and the results published. In Egypt there are distinct limitations in the possibilities of the expansion of cotton acreage but there is a strong tendency toward increasing the proportion of shorter staple cotton and this cotton is more directly competitive with American cotton on the world market than the bulk of the Egyptian cotton produced in the past. Cotton production in the Anglo-Egyptian Sudan has fallen far short of the potentialities ascribed to it in earlier years and serious difficulties stand in the way of further marked expansion of production. A study of cotton production in Brazil was begun late in the fiscal year.

COTTON STAPLE LENGTH IMPROVING

For the sixth year, reports were made on the grade and staple length of the cotton carry-over at the end of the year and of cotton ginned up to specified dates during the season. Regular reports were published weekly at each of five field offices covering separately each major soil region of the cotton-growing States.

Appreciable increase in the staple length of the crop as a whole has taken place during the last 4 years. In 1928 about 14 percent was of lengths shorter than seven-eighths of an inch; by the end of the following year this figure had increased to 20 percent.

Each year since 1929-30 has shown a progressive improvement, and in 1933-34 the proportion of cotton less than seven-eighths of an inch in staple was only about 4 percent. The proportions of seven-eighths-inch cotton in successive crops has varied but little from year to year, and the decreases in cotton shorter than seven-eighths of an inch have been accompanied by increases in the proportions of cotton longer than seven-eighths, principally of desirable lengths ranging from $1\frac{1}{8}$ to $1\frac{1}{4}$ inches in staple.

Evidence is clear that the grade and staple reports have contributed substantially to this result by bringing home the facts regarding crop quality in many hundreds of cotton-growing communities, by causing growers to appreciate the importance of quality in its bearing on value, and by awakening interest in improvement on the part of community leaders, and at the same time strengthening the hands of the State agencies in their own work in this direction.

To encourage such use, the Bureau began by supplying at the end of each season to each cooperating ginner a summarized statement of the grades and staples ginned by him during the season. In 1932, in response to ginners' and growers' requests for more detailed information, this service was further developed by sending to the gins, as soon as the samples were classed, copies of classification sheets on which the periodical reports are based, but without identification of the bales to which the data applied. This service covered more than 840,000 bales.

It was then urged that the service would be more useful to growers if numbers identifying each individual bale classed could be furnished along with the grade and staple information. At the beginning of the 1933-34 season, through a cooperative arrangement with the ginners, each ginner agreed to furnish samples without cost other than transportation, and the Bureau agreed to furnish the desired information regarding each bale. More than 740,000 samples were classed, and growers were notified of the class of each bale through the cooperating ginners.

GROWERS MUST KNOW THE QUALITY OF THEIR COTTON

Although primarily a reporting service, the grade and staple statistics work has contributed to far-reaching developments in the field of marketing. It has long been known that prices to farmers in local markets have reflected only partially the premiums paid for superior quality in central markets. Recent studies show that, although the annual net premium value of the entire crop in central markets over the value of Middling seven-eighths-inch cotton (the quality to which price quotations are related), has been calculated as ranging from \$6,600,000 to more than \$25,000,000, only about 35 percent, on the average, of the premiums for grade and 15 percent of the premiums for staple reach growers. On the other hand, growers' discounts on the lower grades and staples have been less than those prevailing in central markets. This failure to remunerate producers of superior qualities with the premiums prevailing in the central markets and the overpaying for lower qualities obviously tend to encourage the production of lower-quality cotton.

This situation will probably never be satisfactorily met until growers have adequate facilities for having their cotton classed in advance of sale and for obtaining market-price information currently. Practical benefits to be anticipated from such a service are suggested by reports received from many growers and their ginners who cooperated in the grade and staple statistics work in 1933-34. Interviewed ginners indicated that the majority of growers had sold from one-half to three-fourths of their cotton before the information concerning its classification had been received at the gin, but more than one-third of the growers, when questioned, replied that when they knew the grade and staple of their cotton they could bargain with buyers and obtain higher prices. About one-half of the ginner buyers who were questioned stated that when the information was available in time they either bought cotton on the Government class or used the Government class as a guide in determining the price to be paid.

Since the grade and staple statistics work, in keeping with the intent of the authorizing legislation, is organized to yield maximum information on the quality of the crop rather than to provide a classing service to growers, the establishment of an expeditious classing service for growers raises a new question. The possibilities of creating such a service received attention from Congress last session, and in response to a request from the Chairman of the Committee on Appropriations of the House of Representatives a report was prepared on facilities now available to growers and the possibility of making the service general. This report, published by the House as Public Document 405, of the Seventy-third Congress, Second session, is now being widely considered.

MARKET NEWS SERVICE

Emergency activities in agriculture have stimulated an increased and widespread demand for different types of information based on the market news services. The result has been an unprecedented demand for all types of data, not only for recent years but for earlier years, on which to make comparisons. This demand has served to indicate some of the types of new work which is needed to round out our information service on such items as production, movement to market, and consumption.

FRUIT AND VEGETABLE SERVICE COMPLETED NINETEENTH YEAR

The market news service on fruits and vegetables completed its nineteenth year of operation and maintained a program of distribution of approximately 1,100,000 market and other special reports to a mailing list of more than 76,000 names in all sections of the United States. A reduction of reports issued and of names on mailing lists was due to the temporary discontinuance of all reports for a short period after July 1, the delayed reopening of some market stations and the permanent closing of two, and the discontinuance of several special reports. Twenty market stations and 41 field offices were continued in operation.

SPECIAL NEWS SERVICE FOR A.A.A.

Special market news services were performed in cooperation with the A.A.A. on certain fruits covered by marketing agreements, namely citrus fruits and northwestern deciduous fruits. These services were particularly helpful in

the working out and operation of prorating programs under these agreements and for the use of the control committees. Periodic field travel was performed by market news field men, as representatives of the Secretary of Agriculture, to check the accuracy of sales data furnished daily by shippers and to obtain complete reports required under these marketing agreements.

KEEPING THE TOBACCO GROWERS POSTED

Market news offices for tobacco were maintained during the marketing season at Raleigh, N.C., Lynchburg, Va., Lexington, Ky., and Clarksville, Tenn. Daily and weekly summaries of prices of tobacco by grades were published in mimeographed form and made available to growers delivering their tobacco to auction warehouses where the tobacco inspection service was performed. The primary function of such reports is to enable growers to compare prices received with average market prices for tobacco of the same grade, and thus guard against acceptance of underbids. Reports are furnished also to the press and to the tobacco trade.

BUTTER AND CHEESE REPORTS BASIS OF GOVERNMENT BUYING

Statistics regarding production, stocks, prices, and consumption of dairy and poultry products were used extensively by the various emergency organizations of the Government, and particularly by the A.A.A. in shaping its policies and determining its program with respect to the purchase of butter and cheese for the purpose of stabilizing the markets for these products and for relief distribution. Contracts for the purchase of butter and cheese, when based on the current market, specified that the prices reported by this Bureau would be used as the basis of payment. Payment for surplus milk in cities where Federal milk licenses exist are based upon prices established by the Bureau.

SPOT NEWS ON THE LIVESTOCK MARKETS

The Bureau has standardized its methods of market reporting on livestock, meats, and wool, and of news dissemination, so that all markets are treated in exactly the same way. The information on one market is comparable with that on another. This service places spot facts on supply, demand, movement, prices, and related information immediately within the reach of the persons who must have these facts. The radio, telegraph, and daily press cooperated to an unusual extent in disseminating the market facts submitted by this service. Through this service the producer is now in a much better position to market his livestock advantageously.

Through the radio, market information is now on the farm shortly after it becomes known on the market, so that many producers are even better advised than many individuals actually trading on the markets. The service has been used effectively by those producers who wish to market their livestock direct as well as by those who patronize the central markets. The service was drastically curtailed at the beginning of last year as an economy measure, but later it was largely restored on urgent demand from producers and the trade.

SEED-REPORTING SERVICE HELPS GROWERS AND BUYERS

The most important seed reports were issued but because of curtailment in funds and personnel some reports (price and movement, and the weekly seed reviews) were discontinued.

Data obtained by the seed-reporting service indicated that burdensome surpluses of Kentucky bluegrass and redtop seed had accumulated; the situation was relieved through purchases by the Federal Surplus Relief Corporation. Best sources of supply for seeds of plants suitable for reducing soil erosion were furnished to the Soil Erosion Service, Department of the Interior. Need for late-forage-crop seeds in drought-stricken areas was anticipated and various agencies informed regarding those seeds the supplies of which seemed to be ample and those which were short.

The market-news service on grain, hay, and feeds became particularly important during the summer as the result of the drought shortage of feeds in many areas. The Government activities for drought relief were guided by information gathered by the market-news service which maintained 3 offices

in the Central West and 3 on the Pacific coast. A regional service on alfalfa hay for the Central West, Southwest, and Pacific Coast States was operated from Kansas and Los Angeles. The rice-news service was operated from Washington, covering both California and southern Rice Belts. An increased interest in hops with the repeal of the eighteenth amendment materially increased the use of the hop-market-news service which is conducted from Portland and San Francisco.

NEW COTTON-MARKET NEWS ESTABLISHED

A weekly review of the cotton markets was started during the year and developed into a regular service distributed from Atlanta and Memphis in the Cotton Belt. This review, which summarizes the outstanding factors in the week's cotton trade, both domestic and foreign, has been promptly approved by the leading cotton growers and the press throughout the South. An official weekly summary of this character has not heretofore been available except on a very limited scale to southern newspapers. This weekly review is prepared on Saturday in Washington and telegraphed to Atlanta and Memphis, where it is mimeographed and mailed the same day.

STANDARDIZATION AND INSPECTION OF FARM PRODUCTS

The large-scale buying of farm products by Government agencies and the increased consumer interest in graded products have been added evidence during the year of the necessity for dependable standardization work. The Bureau has steadily advanced its work in this field both in number of products covered by standards and in the revisions and improvements of standards previously established. The general revision of the United States grain standards, the first general revision that has been made since these standards were established in 1916, was the outstanding work of the year in standardization. These revisions are described in detail in another section of this report, under regulatory services. A noteworthy development of the year has been the growth of interest among consumer groups in regard to grade designations of farm products in the retail market, which would carry the benefits of standardization all the way from producer to consumer. Some substantial progress has been made toward the development of grades particularly for consumers.

STANDARDIZATION OF FRUITS AND VEGETABLES—FRESH, FOR CANNING, AND CANNED

Standardization work was continued on fruits and vegetables—fresh, for canning, and canned. Grades are now available either in officially promulgated or tentative form for 51 fruit and vegetable products and a number of tentative grades are now practically ready for promulgation.

FRUIT AND VEGETABLE INSPECTIONS INCREASED

The Bureau inspected 318,633 carloads at shipping points in cooperation with the States and 53,185 cars in destination markets where Federal inspectors make inspections on requests from receivers or shippers. This was an increase of 101,841 cars at shipping points over the number last year and of 9,200 cars in destination markets.

The Florida citrus marketing agreement of the Agricultural Adjustment Administration required that all cars should be inspected for grade at time of shipment; therefore 46,668 more cars were inspected in Florida than during the previous year. Closely associated was the inspection of a large percentage of the shipments handled by the coastwise boat lines. The boat lines requested this service as a protection against unwarranted claims for transit deterioration.

The Export Apple and Pear Act of 1933 required all export shipments to be accompanied by certificates issued under the authority of the Secretary of Agriculture showing that the fruit meets the Federal or State grade recognized by the Secretary as the minimum of quality for shipment in export. This act did not materially increase the number of inspections of export shipments, as it has been necessary for several years to obtain inspections to show freedom from spray residues, but it did materially improve the quality of fruit that

moved in export as it is now unlawful to ship unclassified and other low grades of fruit. The inspection service required under this act was administered by the Bureau without increase in funds.

GRADING SERVICE ON CANNED FRUITS AND VEGETABLES

Upon request by any financially interested party such as canners, brokers, bankers, public warehousemen, wholesale grocers, and chain-store operators, the Bureau inspected, graded, and certified the quality and condition of canned fruits and vegetables on the basis of the official or tentative grades, charging a small fee, as usual.

Perhaps the greatest volume of this work was occasioned by financing institutions which may require concrete evidence of the quality of merchandise on which they are asked to make commodity loans.

Considerable interest was noted on the part of some canners in labeling their products in the terms of the grades of the Department—Grade A, Grade B, etc.

An interesting development was the inauguration of futures trading in canned products on the Commercial Exchange of Philadelphia. The futures contract is predicated upon United States grade C merchandise or better. All deliveries on the futures contract are graded by a Federal canned-foods grader to ascertain whether the terms of the contract relating to grade have been met.

A number of specifications, predicated upon Federal grades, to cover the purchase of canned fruits and vegetables, were drafted for certain city, county, and State governments.

CONFUSION IN HOG GRADING

In connection with the direct-hog-marketing research program, 198,551 hogs were graded in strict accordance with the Federal tentative hog standards at livestock concentration yards, auction markets, packing plants, and central markets, in 14 States. While conducting this program it was found that more than 72 distinct local grade standards and classifications, besides the Bureau's standards, were in use for hogs alone. The confusion and evident economic loss that result from the use of these numerous market standards demonstrated conclusively the need for the application of a single, simple, uniform standard if producers are to be on equal footing with those who buy their hogs and with those who compete with them in selling.

PRODUCERS SHOW GREAT INTEREST IN LIVESTOCK GRADE DEMONSTRATIONS

Regular educational activities in livestock grading demonstrations, conducted among ranchers and farmers annually for 12 years in cooperation with the Office of Cooperative Extension Work and the State agricultural colleges, was continued in six of the Intermountain and Western States and in one of the Southeastern States. Fifty-six meetings were held in 42 counties with attendance of over 8,000. Requests from 8 States could not be filled.

In several meetings, held at the State agricultural colleges, students participated, but most of the grading demonstrations were held at individual ranches where ranch livestock was used. The fat and feeder cattle and lambs were graded according to the Bureau's standards, and breeding cows and ewes were classified from a production and marketing point of view. Ranchers, farmers, and students participated in the grading and later put their experiences to use in selecting livestock for market or production purposes.

Many persons drove over 100 miles to attend these demonstrations. In some districts the same ranch has been used each year for 8 or 9 years; in other districts the ranchers rotate the meetings throughout the territory. Each year has witnessed notable improvement in herds and livestock selected for sale.

MEAT-GRADING SERVICE GROWS

A larger volume of meat was graded, according to official standards during the year, without increase in force. This increase was due largely to the increasing consumer realization of the quality significance of the grade names stamped on the meat.

Meats graded in response to consumer demand totaled 275,586,472 pounds, or an increase of 19.2 percent over the previous year. Beef graded and stamped totaled 257,760,853 pounds, an increase of 44,281,385 pounds or 20.7

percent over the quantity graded and stamped during the previous year. This was 5.2 percent of the total quantity of beef produced throughout the United States under Federal inspection. Beef graded and stamped was largely in the Prime, Choice, and Good grades; the quantity graded and stamped was 19.4 percent of the total quantity produced falling in these grades.

CITIES ASK FOR MEAT-GRADING SERVICE

Urgent requests for service have come from large marketing and consuming centers where it is not available, such as Denver, Seattle, and Los Angeles. Seattle offered to pay all supervision costs in order to have the Federal meat-grade standards and the stamping service introduced and maintained on all meats sold in that city.

At present many in the packing industry maintain individual standards. In such cases the packer has his own grade terms and brands, which are also his private trade labels. There is a general lack of uniformity in such standards as between packers, from season to season, and for different sections and cities, thus preventing the maximum benefits possible from grading and branding.

PROGRESS IN WOOL STANDARDIZATION

Numerous grade standards exist for wool, especially between producers and dealers, with considerable variation even among the highly organized groups in the wool marketing and manufacturing industry. The Bureau's wool standards for diameter have provided a means for reducing the confusing standards to one basic standard.

Extensive educational work was conducted to further progress toward this end, in cooperation with six western wool growers' associations. Sixty-five sets of the official standards were sold or otherwise issued for commercial and official use, in addition to the distribution of wool-grade charts and descriptive material.

A test was conducted in the range States of the practicability of grading fleeces at the shearing pens. Fourteen thousand fleeces, or over 100,000 pounds, of the 1934 wool were graded according to the official standards. Final returns from the sales of these wools will be assembled and checked against those of ungraded wools of similar character to determine the advantage that may accrue if wools are carefully graded at points of origin instead of after reaching market.

MILLIONS OF POUNDS OF BUTTER AND CHEESE GRADED

Grading services of the Bureau were used in the purchase of large quantities of butter and cheese by the A.A.A. and the Federal Surplus Relief Corporation. More than 50,000,000 pounds of butter were graded in New York, Philadelphia, Chicago, Seattle, Portland, and San Francisco in connection with the specifications of the contract under which it was purchased. This butter was cut into prints or rolls, and much of the supervision of the printing operations was handled by the Bureau.

More than 6,000,000 pounds of cheese was purchased by the A.A.A., subject to grading by the Bureau, to see that it conformed to the specifications, and 3,600,000 pounds was processed in 10 plants into half-pound packages, under the Bureau's supervision, for relief distribution.

CENT A POUND MORE TO PREMIUM-CHEESE PRODUCERS

A new development in the cheese-grading work was undertaken in cooperation with the Wisconsin Department of Agriculture to benefit both producers and consumers. American cheese is tentatively graded and if it grades 93 score when delivered by the factories to the warehouse, it is stamped with an official grade stamp. Factories producing this cheese receive a premium of 1 cent per pound. Later, before the cheese is shipped, it is graded finally. Arrangements are being made to process cheese under Government supervision from 93-score cheese, to assure consumers that this process cheese was produced from a superior quality of natural cheese.

DAIRY AND POULTRY PRODUCTS GRADING WORK CONTINUES

A series of public conferences was held to consider the tentative United States standards of quality for individual eggs. After minor revisions, the

standards were promulgated by the Secretary of Agriculture as the official United States standards for individual eggs.

Tentative United States standards and grades for live poultry were issued.

The grading service on butter and eggs was extended to St. Louis through a cooperative arrangement with the merchants exchange of that city. Through cooperation with the Illinois Department of Agriculture a cream and butter grading service was made available to a group of cooperative creameries in that State.

GRAIN STANDARDS RESEARCH PRESSES FORWARD

Constant search is in effect for ways to improve grain standards, and inspection methods and equipment. Promising suggestions from the field and from the industries are subjected to research consideration by the organized research projects located at Washington, D.C., San Francisco, Chicago, New Orleans, and Portland, Oreg.

Subjects now under continuing investigation are moisture testing, grain and rice grading equipment, factors that index the malting properties of barley, and the usefulness of kernel texture in soft red winter and white wheat as an index of flour quality and baking performance.

As new moisture-testing devices are invented and placed on the market, the Bureau subjects them to exhaustive tests with many kinds of grain and rice, produced through a series of years in different areas, to determine their suitability for use in official inspection.

The efficiency of the new electric moisture meters for grain and rice inspection purposes, for example, is contingent on the use of calibration charts that will convert meter readings into the percentage terms used in grain and rice standards. Accurate charts of this character can be formulated only through several years of thorough research with many grain and rice samples of varying quality and condition.

Similar research activities are continuing in order to prepare charts for other agricultural commodities, such as beans, cowpeas, alfalfa seed, clover seed, lespedeza seed, and grass seed, in the inspection and commercial handling of which accurate and rapid moisture testing is important.

A long period of research has resulted in the devising of an automatic, efficient, motor-driven device for use in the determination of dockage and foreign material in grain, and in the sizing of malting barley and oats. The device is now being finally designed for quantity manufacture. An automatic mechanical sieving process can then be substituted for hand-operated sieves in inspection procedure.

Progress was made toward devising a small rice huller or sheller that will mill inspection-size samples of rice to determine the percentage of head rice in the sample in a manner comparable with commercial milling operations. This will enable rice inspectors to make approximately accurate "milling quality" determinations on samples and to state the results on certificates.

In addition to the new and revised grain standards reported elsewhere, sufficient research was concluded to warrant the promulgation of standards for malting barley produced east of the Rocky Mountains. This research is being expanded to include barley produced in the far Western States in order to meet trade requirements for standards for western malting barley. These studies are of pioneer character. A small malting plant is being installed at Washington in which malting-performance tests can be made as a check against those more rapid methods of evaluation that lend themselves to practical inspection procedure. Studies are in progress to determine the correlations between starchy kernel texture and malting performance, between starchy kernel texture and protein content, and between protein content and malting performance. The malting industry and the barley trade are cooperating.

Research consideration of the usefulness and importance of kernel texture in the wheat classes Soft Red Winter and White as a measure of potential milling quality and baking performance, conducted for several years, are being continued. The official United States standards for hard red spring wheat, hard red winter wheat, and durum wheat make a greater use of kernel texture as a measure of potential milling quality than do the official standards for soft red winter wheat and white wheat. Those interested in the handling, merchandising, and processing of Soft Red Winter wheat and White wheat have suggested that these classes be subdivided further in the official standards according to the percentage content of hard or soft kernels.

Results so far obtained on about 400 samples of white wheat indicate that kernel texture is a reasonably dependable measure of the potential milling quality of the white wheats for bread- and pastry-flour purposes. The question, therefore, of whether additional subclasses in the official standards for white wheat based on kernel-texture specifications would serve a more useful purpose in the national commerce in white wheat than an expanded use of protein testing as a measure of potential milling quality, is a question to be resolved largely by the requirements of the industry.

Results to date, involving about 700 samples of soft red winter wheat from various producing areas indicate that no close correlation exists in this kind of wheat between kernel texture and protein content. Extensive research with soft red winter wheat is needed to determine the relationships between kernel texture and potential milling quality for bread and pastry purposes, as well as to determine a useful and reliable standard laboratory check test for indicating the pastry quality of flour made from soft red winter wheat. Results of these studies so far obtained are being prepared for publication.

RICE INSPECTIONS TREBLED

Rice-inspection service was increased materially, especially in Louisiana, Texas, and Arkansas. A total of 29,868 rice-inspection certificates were issued (26,222 in Southern States and 3,646 in California), representing an increase of 20,483 inspections over the previous year. For the Southern States the increase in the number of inspections amounted to 325 percent.

This expansion was principally the result of the marketing agreement for the Southern rice States, under which the inspection certificates covering rough rice were used as a basis for establishing the price paid producers by millers and under which the inspection certificates covering milled rice and brown rice were used to establish the price at which milled and brown rice should be sold.

Two new Federal-State rice-inspection laboratories were established in Louisiana and two new Federal laboratories were established at New Orleans, La., and at Stuttgart, Ark. Eleven rice-inspection laboratories were operated, 9 in Louisiana, Texas, and Arkansas, and 2 in California. All sampling and inspection service conducted by these laboratories was supervised by Federal supervision offices located at New Orleans and San Francisco. Most of the inspection was conducted under cooperative agreements between the Bureau and the States of Louisiana, Texas, and California.

STANDARD GRADES FOR TOBACCO GAINING IN USE

Elements of grade in tobacco have been analyzed and standards have been established in tentative form for many of the 25 types of tobacco grown in the United States. During the year especial attention was given to Maryland tobacco, burley, and northern shade-grown, for which tentative standard grades were established and issued in mimeographed form.

In cooperation with State agencies the Bureau continued its grading or inspection service for farmers, giving farmers definite information as to the quality of tobacco being offered for sale. The volume of tobacco inspected was 197,952,235 pounds, an increase of approximately 70 million pounds. The service was expanded to supply the A.A.A. with basic information on market prices according to grade, needed in connection with its marketing agreements with manufacturers, and to effectuate a marketing agreement entered into by the growers of shade-grown cigar-wrapper tobacco approved by the Secretary of Agriculture. Service was inaugurated in Maryland, in cooperation with the State agricultural college, the State board of agriculture, and the chief tobacco inspector at Baltimore, under provisions of a State mandatory inspection act. The entire crop of Virginia fire-cured tobacco, type 21, for 1933, was graded in cooperation with the Virginia Division of Markets under a mandatory grading law enacted in the State.

Instruction was given in preparing tobacco for market, as an adjunct to the tobacco-grading service. A representative of the Bureau met with vocational agricultural teachers and with classes of farm boys and adults, giving practical demonstrations of tobacco sorting, and discussing the elements of quality and grade. In Kentucky the State director announced that this subject would occupy the full time of night classes during the succeeding year.

Based on the inspections, daily and weekly market news reports are issued, giving the market value on a grade basis. Tobacco producers are able to use

this information in marketing as well as financing their operations. Farmers pay a fee for this voluntary inspection service. The cost varies materially with the volume graded. On markets where the volume is relatively small it is necessary to charge 10 cents per hundred pounds, while on markets where the volume is larger a fee as low as 2 cents per hundred pounds is charged. It has been demonstrated that the inspection or grading service together with market news reports have enhanced the price of tobacco.

The Bureau is convinced that it would be to the best interests of the tobacco growers as well as the trade generally for all tobacco sold at public auction to be officially graded and sold according to Government standards. The States of Maryland and Virginia have already enacted mandatory tobacco-grading legislation. Kentucky recently enacted a law making the grading of tobacco in Kentucky compulsory on all markets in the discretion of the commissioner of agriculture, and assessed a small fee to be paid by the buyer to help defray the cost. The wide variation in quality and color of tobacco is reflected in the wide difference in the market value of tobacco. It is not uncommon for different lots of tobacco produced in the same field to sell for from 2 to 50 cents per pound, according to the grade. With this great range in quality it is not practicable for the average farmer to judge with any degree of accuracy the market value of his tobacco unless his product is first graded and he has access to market prices on a grade basis.

ALFALFA SEED VERIFIED AS TO ORIGIN

The seed-verification service had perhaps the most successful of its 7 years. This service provides to the buyer of verified-origin seed reliable assurance that he is getting alfalfa or red-clover seed of the desired origin. The quantity (nearly 43,000,000 pounds) of alfalfa seed, verified as to origin, was nearly 6,000,000 pounds more than during any previous year. More certificates of verified origin were handled and the number of dealers (68) enrolled in the service was greater. Country shippers are attracted to this service as a larger percentage of the buyers insist on getting verified-origin seed.

REGULATORY SERVICES

GRAIN STANDARDS REVISED

The United States Grain Standards Act, passed in 1916, authorized the establishment of uniform grain standards and inspection in the domestic and export grain commerce of the United States. It required that all grain for which standards have been established, which is sold, offered for sale, or consigned for sale, by grade, and shipped or delivered for shipment in interstate or foreign commerce, from or to an inspection point, should be inspected, graded, and certificated under the official United States standards.

As a result of the conclusion of a 4-year study and review of the grain standards, conducted with the cooperation of the several branches of the industry and of a number of the State agricultural colleges, the grain standards were revised to meet changed conditions. The principal purpose was to bring the standards into close conformity with modern conditions of grain production, merchandising, storage, and processing, thus improving the inter-market uniformity of grain grading.

The Bureau's research data and suggestions for new and revised standards were published in Miscellaneous Publication No. 173 and submitted to committees representing all branches of the industry for consideration. Representatives of the Bureau discussed the proposed standards with the branches of the grain industry at the public hearings held in important grain centers and at numerous informal conferences. The evidence so obtained was weighed carefully and considered with the evidence obtained from the Bureau's investigations in making final conclusions.

As a result of this program of research and of 14 public hearings, revised standards for wheat, rye, oats, feed oats, mixed feed oats, and barley, new standards for malting barley produced east of the Rocky Mountains, and new standards for Mixed Grain, were promulgated by the Secretary March 31, 1934, and made effective July 2, 1934; new standards for flaxseed were promulgated on the same date and made effective August 1, 1934; and revised standards for corn and grain sorghums were promulgated on the same date

and made effective September 1, 1934. The Bureau believes that the adoption of these standards marks a progressive step in the improvement of grain inspection and marketing in the United States.

At the close of the fiscal year there were 403 grain inspectors licensed under the act, and inspection was available at 171 points in 33 States. The sampling, grading, and certification work of these licensees was supervised by the Bureau through 46 field offices located at important grain markets, and through two boards of review located at Chicago, Ill., and Portland, Oreg. The total volume of market grain of all kinds inspected during the year by the licensed inspectors under the immediate supervision of Federal district supervisors was 1,037,646 car lots, or 1,613,757,000 bushels. The total number of appeal inspections made during the year by Federal grain supervisors was 33,984, which represents approximately $5\frac{1}{2}$ percent of the total volume of grain inspected. For the purposes of maintaining accurate and uniform application of the grain standards among Federal district supervisors and licensed inspectors, the boards of review at Chicago and Portland reviewed difficult problems and interpretations in the grading of 43,724 samples of all kinds of grain.

QUICKER AND MORE MOISTURE TESTS

Improved methods of moisture testing were adopted for grain-inspection purposes concurrently with the adoption of the revised and new standards, as a result of the conclusion of a 6-year research program on the subject of determining the moisture content of grain. During this research, moisture determinations were made on 10,500 samples of all kinds and classes of grain by the air-oven test, the Brown-Duvel test heretofore used for commercial inspection purposes, and by the recently devised electric moisture-meter test. As the results obtained with the electric moisture meter were more accurate in comparison with the air-oven test than those obtained with the Brown-Duvel test, the electric moisture method was adopted. This will improve the ultimate accuracy and uniformity of grain inspection and will make possible a material and useful expansion of the testing of grain for moisture at low cost, for a single test by the new method can be made in less than 1 minute compared with about 45 minutes required for the Brown-Duvel test.

COTTON FUTURES ACT SHOULD BE BROADENED

The Cotton Futures Act, passed in 1914 and reenacted in 1916, aims primarily to maintain a close relationship between futures contract prices and prices of spot cotton, and particularly to prevent the undue depression of futures prices. These ends it seeks to accomplish through regulation of the form of contract employed, through the use of "commercial" differences when grades other than the basis grade are delivered, and through the performance of such referee functions as the classification of cotton delivered and the supervision of commercial quotations by the Department.

That the purposes have been well served on the whole, particularly since 1930, is evident from a comparison of the spot- and futures-price relationships in American markets with those which have prevailed in the principal futures markets for American cotton abroad. No period of such length has been recorded in which the American markets have performed more satisfactorily their function of providing facilities for hedges. It is fortunate for cotton growers that this has been true during the depression because it has enabled merchants and dealers, when production of cotton has vastly outrun consumption, to purchase, although at low prices, all the cotton that growers have needed to sell and it has attracted much foreign futures trading to American markets.

The long decline in cotton prices, however, from 1929 to 1933 gave rise to much questioning as to whether, because of their methods of trading, the exchanges were lending themselves to unnecessary depression of prices when price depression was obviously contrary to public welfare. The usual explanations of the nature and benefits of speculation were frequently challenged, and proposals for curbing price fluctuations and for limiting the extent and concentration of individual operations were freely advanced.

In the last session of Congress, several bills were introduced, aiming to increase regulatory control of futures trading in commodities. Legislation of this kind was enacted in the House of Representatives shortly before adjourn-

ment but was not considered in the Senate. The Department of Agriculture at the outset recommended the enactment of new legislation with a view of correcting the known constitutional weakness of the United States Cotton Futures Act of 1916 and of making it possible to secure systematic information concerning the relationships of trading to price behavior. Enlightened concepts of trading and well-considered policies toward the institutions through which it is done are of utmost importance if these institutions are to perform most effectively their functions in the economical distribution of agricultural products. Because of the extent to which futures trading has become integrated with the ordinary processes of marketing, the Bureau has believed that legislation dealing with the futures exchanges should be drafted with the special features of each major commodity as well as public policy in mind.

COTTON STANDARDS GROWING IN USE

Use of varying standards, chiefly of Liverpool origin, continued in the spot-cotton trade until the United States Cotton Standards Act of March 4, 1923, became effective. This act extends the standardization authority given in the Cotton Futures Act, and contains mandatory provisions for the use of the official cotton standards of the United States in all transactions in interstate and foreign commerce wherein any standards or system of classification are used.

Use of the official standards in export and foreign trade is facilitated by the universal cotton standards agreements between the Secretary of Agriculture and the leading cotton-trade organizations of Europe. The universal standards, as well as the other official cotton standards of the United States not embraced in the universal standards agreements, have now come into general use throughout the world, wherever American cotton is bought and sold, and it is the duty of the Bureau to supply on request practical forms of the standards at fees provided in the regulations.

The usefulness of standards of grade and staple to growers is affected by other groups in the industry. In actual buying and selling the wishes of the purchaser frequently determine whether the standards are used. Thus the practices in the use of standards by manufacturers as the last purchasers and as the actual users of raw cotton have an important influence upon their use by others.

As the Cotton Standards Act permits the sale of cotton on actual samples or according to private types when used in good faith and not in evasion of or substitution for the standards, it is gratifying to learn through a study lately completed that about 70 percent of manufacturers' purchases are described according to the official standards for grade, and about 50 percent are described according to the standards for staple. A study is now under way to determine how well the standards are meeting the requirements made upon them. Valuable information received from manufacturers will be considered along with data on the extent to which the standards "fit the crop."

Reports from licensed cotton classifiers indicate that during the cotton season 1933-34 those employed by cooperative associations classified for those organizations a total of 576,957 bales, and those not employed by the cooperatives classified 1,088,240 bales. In addition, it is estimated that licensees employed by one of the cooperative associations ascertained the grade and staple of about 1,200,000 bales for farmers who did not deliver the cotton to the association for marketing. Thus the holders of licenses under the Cotton Standards Act are reported to have classified almost 3,000,000 bales of the 1933 crop.

FEDERAL WAREHOUSE ACT AIDS GOVERNMENT FINANCING

Financial conditions during the year caused additional demand for the operation of the Federal Warehouse Act in order that the necessary credit might be obtained to permit an orderly marketing of products. Banking conditions in production areas caused rural bankers to keep their agricultural loans as liquid as possible. Many bankers refused to make loans on stored products unless they were supported by warehouse receipts that were acceptable under Federal Reserve Board rules. As receipts issued under the Federal warehouse law met that requirement, loans predicated upon them were readily rediscountable with Federal Reserve banks.

In many sections producers, processors, and merchandisers of agricultural products sought the financial assistance of various governmental financial

agencies, such as the Reconstruction Finance Corporation, the intermediate credit banks, and the newly created banks for cooperatives. The 10-cent-per-pound cotton loans made through the Commodity Credit Corporation were also supported in many instances by Federal warehouse receipts. Each of these agencies accepted these receipts as collateral without question.

Activities of these loan agencies have brought a considerable realignment of work in different States. Crop conditions have also exerted an influence. When local crops have decreased considerably warehousemen have surrendered their licenses, whereas increased crops in other areas, or changed conditions, have brought a demand for licensing of warehouses in new areas. Thus the work is in a state of change from year to year which results in the cancelation of many licenses and the issuance of licenses to other warehousemen located in other sections.

UNFAIR PRACTICES BEING ELIMINATED IN FRUIT AND VEGETABLE TRADE

The Perishable Agricultural Commodities Act of 1930 requires that commission merchants, dealers, or brokers handling fresh fruits or fresh vegetables in interstate or foreign commerce, shall be licensed by the Secretary of Agriculture, and it makes certain practices in the handling of such products unlawful.

As the Produce Agency Act is a criminal statute providing fine or imprisonment for the fraudulent or dishonest handling of produce by a commission agency, violations are reported to the Department of Justice, and convictions are secured only after trial in Federal district courts. Convictions or pleas of guilty were obtained in Federal district courts in 13 cases during the year. In 2 cases the court imposed sentences of 3 months' imprisonment; in 1 case a fine of \$1,000 was imposed; in other cases the usual fine was \$100; and in some instances sentences were suspended pending restitution.

The number of complaints received under both acts showed little change, but although fewer hearings were held, and fewer orders were issued by the Secretary under the Perishable Agricultural Commodities Act and fewer cases were referred to the Solicitor under the Produce Agency Act, a smaller number of cases were pending at the close of the year. Forty-five percent of the decisions made under the Perishable Agricultural Commodities Act during the year were rendered without formal hearings. Of the total number of cases which have been closed during the 4 years the act has been in existence, 60 percent have been settled as the result of informal administrative action. At the close of the fiscal year 15,580 licenses were in effect as compared with 14,347 at the beginning of the year. License fees amounted to \$145,548.71, an increase of \$6,844.39 over receipts during the preceding year.

Fifteen amendments to this act, which greatly strengthen it, became effective on April 13, 1934. These changes broaden the act to include any fraudulent statement in connection with a transaction, direct the Secretary to refuse to issue licenses under certain conditions, authorize the Secretary to revoke the license of a firm which employs one whose license has been revoked, authorize the Secretary to withhold issuance of a license if he believes that the application contains false statements, and to revoke a license if he finds it was obtained through a false statement. They provide for the decision of complaints without formal hearing where the amount of damages does not exceed \$500, and permit suit on reparation orders to be brought in the United States district court of the district in which the complainant lives, providing for appeal from Secretary's orders to the United States district court and for the automatic suspension of a license pending failure of a licensee to pay a reparation order or take an appeal within the period described.

EXPORT APPLE AND PEAR ACT PROTECTS FOREIGN MARKETS

The Export Apple and Pear Act makes it unlawful to export apples and pears unless accompanied by a certificate issued under authority of the Secretary of Agriculture showing that such fruit meets the Federal or State grade recognized by the Secretary as a minimum of quality for shipment in export. Temporary regulations under this act, promulgated on July 5, 1933, provided that any lot of apples may be exported which meet each minimum requirement of the U.S. Utility and U.S. Utility Early grades for apples. Such apples should not contain maggots and not more than 2 percent by count may have apple maggot injury and not more than 2 percent may be infested with

San Jose scale. Pears are required to meet each minimum requirement of the U.S. No. 2 grade for pears and the same requirements as to scale and apple maggots as provided for apples. Packing and marking requirements were also established.

Permanent regulations were promulgated on August 31 effective September 1; they were amended as of February 1, 1934, to simplify procedure.

Only one violation was prosecuted. A shipper who represented that apples offered for shipment had been inspected and found to comply with the act when, as a matter of fact, no certificates had been issued on these shipments, pleaded guilty and was fined \$100.

STANDARD CONTAINER ACTS ELIMINATE DECEPTIVE CONTAINERS

Fruit and vegetable containers that are subject to the provisions of the Standard Container Acts are now manufactured by approximately 382 manufacturers located in 32 States. In many instances manufacturers make more than one type, size, or style, so that in the aggregate some 1,500 items are subject to the provisions of the two laws.

In the administration of these laws samples were received from about 48 percent of the manufacturers; 1,380 lots, comprising 10,447 samples, were examined and tested. About 67 percent were found to comply with requirements; about 18 percent were undersize.

An amendment to the Standard Container Act of 1916, passed by the last Congress, provides a special 1-pound Climax basket for mushrooms, fixes the dimensions thereof, and provides that it shall be plainly marked "for mushrooms only." More comprehensive legislation pertaining to the standardization of containers for fruits and vegetables was introduced in the Senate and endorsed by the Department. This bill, in the nature of a container code, sought to equalize and simplify the provisions of existing legislation and to extend the principle of standardization to cartons, crates, and boxes. No action was taken on the measure.

A conviction was obtained in a case filed in 1932 involving the manufacture of unlawful bushel baskets; cases involving two parties and alleging the unlawful manufacture and sale of $\frac{1}{2}$ - and 1-bushel baskets, and another alleging the sale of illegal 10-quart hampers were instituted. An investigation of a complaint alleging the sale of illegal berry boxes in Tennessee resulted in the voluntary destruction of approximately 25,000 questionable berry cups.

GENERAL ECONOMIC RESEARCH

Underlying virtually all the services of this Bureau is a broad program of research. Progress in ironing out the hundreds of problems that must be solved in the production and distribution of farm products in this vast country, does not come haphazard. One of the Government's plain responsibilities is to investigate painstakingly those economic problems to whose solution it is obligated to become a party. Adequate research prevents costly mistakes, especially in the field of public action.

The Bureau had to fit its research program to a shortened budget this year but it has carried on the most essential lines with reasonable success.

Studies of the demand for farm products, developed in this Bureau during the past several years, have been of great value in determining the necessary adjustments in production to relieve market surpluses and have made it possible to forecast with a reasonable degree of accuracy the effects of such adjustments on prices. These studies have also been useful as a basis for determining contract prices of a number of commodities sold under marketing agreements. The determining of production adjustments and of allotments and prices under the marketing agreements have not only depended largely upon the past research but have made it necessary to conduct many special studies of emergency problems. They have also made it necessary to keep daily, weekly, and monthly records of data bearing on the agricultural situation and outlook.

WHO PAYS THE PROCESSING TAX?

At the request of the Agricultural Adjustment Administration the Bureau has made detailed statistical studies of the incidence of the processing taxes on wheat, cotton, and hogs in order to determine the extent to which the taxes are being borne by consumers, by producers, and by the processors and dealers.

These studies have shown that, except for short periods, processors of these commodities have widened their margins enough to cover the tax payments. The wheat tax and most of the cotton tax were borne by the consumer in the form of higher retail prices of flour and of cotton goods. For a short period in the winter, before the supplies of hogs were reduced, the hog tax was borne largely by the farmers. Beginning in February the market price of hog products was raised as a result of curtailed supplies. Considering the 1933/34 season as a whole the processing tax, together with the adjustment of supplies, has increased pork prices to the consumer and when benefit payments are taken into account the receipts of cooperating farmers have also been raised.

SPECIAL TARIFF STUDIES

Recent developments in connection with the tariffs on imports into the United States, and particularly the amendment to the tariff act which gives the President authority to enter into reciprocal trade treaties with foreign countries, have directed much statistical research toward the possibilities of international trade and the extent of competition between domestic agricultural products and the products that might be imported. A series of studies have been made to provide various agencies of the Government with the analysis of the probable economic effects of seasonal import duties on a large number of agricultural products. Detailed study has been made of the sources of supply, both domestic and foreign, of the marketing periods of such supplies, and of the probable effects of imports on prices.

For example, studies of the seasonal movement of several kinds of fruits and vegetables show that imports of such products in certain months of the year have relatively small influence upon the interests of growers in this country. In such cases imports do not coincide with our major marketing periods.

A study of 20 major fats and oils has been made to analyze proposals for imposing taxes on the importation of oils or to establish import quotas as well as to study the probable effects of proposed processing taxes on several kinds of oils. Data on production, consumption, and trade, from 1912 to 1933, were assembled and published.

WATCHING THE SPREAD BETWEEN PRODUCERS AND CONSUMERS

Increased wages and material costs under the industrial codes, and the collection of processing taxes, have necessarily increased the cost of getting food and other farm products from the farm to the city family. If such costs are raised too much or if there is pyramiding by which dealers increase their charges more than enough to cover such increases in cost, agricultural recovery will be delayed and incomplete. It is therefore important that careful comparisons be made between prices paid by city consumers for such commodities as bread, pork, and cotton cloth and the prices received by farmers for the raw materials used in making these commodities. Retail, wholesale, and farm prices of agricultural commodities have been tabulated and studied; and monthly comparisons have been made of city retail prices of 14 foods and 4 cotton products with the prices received by farmers for the materials used in making these products. The results have been used by several recovery agencies.

The figures indicate that the rise in the cost of transportation, processing, and marketing, has been moderate since the low point reached early in 1933. There is no evidence of widespread pyramiding of prices. The proportion of the consumer's food dollar going to the farmer increased from 33 percent in the first half of 1933 to 37 percent in the first half of 1934, owing to substantial increases in retail prices, which more than offset the increased costs of transportation, processing, and marketing. Special detailed studies of the margins of hog packers, flour millers, and cotton manufacturers have been made in connection with studies of the effects of the processing taxes. These studies have indicated that margins of processors have been increased to cover the payment of the taxes.

FARMERS' INCOME INCREASES ONE BILLION DOLLARS

For several years the Bureau has been studying farm incomes and has been revising and improving the methods of estimating income. Reliable data on net incomes received by farmers constitute probably the best index as to the

economic condition of agriculture. Preliminary data indicate that the cash income, including rental and benefit payments, of farmers rose from \$5,051,000,000 in 1933 to \$6,000,000,000 in 1934. In 1929 the income of farmers was \$10,479,000,000.

For the first time the Bureau has estimated and published current monthly estimates of farmers' cash income from farm marketings. These estimates show the income received for the principal groups of commodities as well as the total monthly income from all farm marketings. These estimates, together with adequate data on prices paid by farmers, make possible a measure of month-to-month changes in the purchasing power of American farmers.

The index of prices received for farm products which has been developed in this Bureau has become generally accepted and used throughout the country much as is the Bureau of Labor Statistics index of wholesale prices. Prices of tobacco, retail milk, wholesale milk, and several truck crops have been added to the former index. Weights used in averaging the prices of the different commodities have been revised and are now based on the average quantities sold from 1924 to 1929.

Demand for information on local prices of farm products increased steadily as a result of the vital importance of these data in the administration of the Agricultural Adjustment Act. Basic information on the purchasing power of farm products has been provided by the regular monthly inquiries on prices received by farmers and by the regular quarterly inquiries on prices paid by farmers for commodities purchased. Steps have been taken to improve the accuracy of these data, in view of their new uses.

For several years the Bureau has been studying and revising the historical record of acreage, yield, and production of principal crops in the United States. During the year, revisions of these data on corn and oats were made and published. Similar revisions were practically completed in the case of other major crops and are being prepared for release. These revisions have been much needed for many years as a basis for studying trends in production and changes in the demand for farm products.

PER-CAPITA BUTTER CONSUMPTION DOWNWARD SINCE 1896

Estimates of butter production were revised and a new historical series was published covering the period 1869 to date, including butter produced on the farm and butter produced at creameries. A study of the revised data reveals that the trend of per-capita butter production has been downward since 1896. Since exports of butter amount to only a small percentage of the total production, it appears that the per-capita consumption of butter in this country has also dropped. The greatest decrease was from 1896 to 1919. Since 1924 there has been little change in the rate of per-capita butter consumption.

WHEAT-FLOUR CONSUMPTION MAINTAINED

Estimates of wheat-flour production and consumption were revised and brought to date. These estimates indicate that over a period of years there has been a very small decline in the per-capita consumption of flour in the United States. The decline in per-capita consumption has been much less rapid in recent years than that which occurred during the World War. The total flour consumption of the country has been maintained at a practically constant level for the last 10 years.

Because of reduced wheat acreages, combined with low yields, wheat production of the United States for 2 successive years has been less than consumption. This has brought new problems with regard to location of wheat supplies and the adequacy of supplies of different classes of wheat. Attention was given to building up more comprehensive data concerning wheat supplies and distribution, by classes and by regions. These data indicate the need for special methods of handling the North Pacific wheat surplus, if prices in that region are to be maintained at levels corresponding to those prevailing in other parts of the country.

EGG-PRICE STATISTICS IMPROVED

A new index of wholesale egg prices and a new historical series of feed-egg price ratios have been prepared for publication. These new series give a better picture of the economic situation of the egg industry than has previously been

available. They should be of great value in forecasting trends of numbers of chickens and trends of egg production. When more than 6 dozen eggs are required to buy 100 pounds of poultry feed the number of chickens raised per flock the following year is decreased. When 100 pounds of feed can be bought for less than 6 dozen eggs the number of chickens per flock tends to increase. The decline in numbers of chickens per flock in 1934 was accurately forecast from the relationships during the years from 1927 to 1933.

DIRECT HOG-MARKETING STUDY APPROACHES COMPLETION

The direct hog-marketing study was broadened at the request of the Agricultural Adjustment Administration. Some critics maintained that, as a result of direct marketing, the price level for hogs had been reduced by as much as \$2 to \$3 per hundred pounds below that which would have existed had these animals been sold through central markets. They petitioned the Government to prevent the growing practice. Supporters of direct marketing on the other hand contended that this method of marketing was the result of natural economic developments which had taken place over a period of years and that this system netted the producers certain definite economies by avoiding, during a period of low prices, relatively high marketing costs. It was evident that the Federal Government should take no action until available facts could be obtained and evaluated.

A research unit was organized and extensive investigations were conducted covering the various economic phases of this problem. Field work has been completed and the basic data obtained. The final report should be ready at an early date.

TOBACCO-WEIGHT LOSSES DETERMINED

The losses in weight of tobacco from the fresh-cured weight to the time of manufacture has been the subject of investigation during the past 2 years and results are now practically completed. These studies show losses in different types of tobacco varying from 2 to 15 percent between the time the tobacco is sold by the grower and the time it is packed for storage, and losses varying from 20 to 30 percent or more as a result of stemming and minor losses from drying during long storage.

The partial results of these studies were utilized by the A.A.A. in analyzing statistics of tobacco used in manufacture in arriving at rates of the processing tax and in analysis of the general supply situation with respect to the different tobacco-producing districts.

TECHNICAL COTTON RESEARCH

Selection of cottons for particular uses as, for example, the manufacture of automobile tires and of fine yarns and threads, still holds a large element of chance in spite of the best classification procedure that has yet been developed. To reduce this chance, it is necessary to improve present classification methods and to establish practical character standards. To gain a better knowledge concerning the intimate structure and properties of cotton fibers and their variabilities, highly technical studies are being made with the aid of every new scientific device available, including powerful microscopes, polarized light, the X-ray, and numerous other forms of precision apparatus. Information obtained from these studies is important not only to cotton quality standardization, but to cotton utilization and to cotton breeding and production.

A DISCOVERY REGARDING COTTON-FIBER STRUCTURE

New information concerning the nature of the individual cotton fiber that differs radically from old concepts of fiber structure has been developed by one series of the Bureau's investigations carried out in cooperation with the Boyce Thompson Institute. This new evidence suggests that each of the many fibrils which make up the cotton-fiber wall is composed of very small particles of cellulose, joined end to end in an orderly manner, and held together in a brick-and-mortar-like fashion by means of a cementing substance. The cellulose particles, on the one hand, appear to be notably inert and resistant to many agencies; the cementing substance, on the other hand, seems to be much less stable and subject to changes of various kinds. In the light of these

observations, it is not impossible that differences in cotton character and use values may be found to be more intimately associated with the cementing substance and less closely related to the cellulose constituents than former theories of fiber structure have assumed. Further investigation is needed, but this finding appears to have both practical and scientific importance. Its immediate practical value lies in the fact that it affords a needed approach to a rational understanding of such important character properties of fiber quality as strength, elasticity, and durability, and of the behavior of cotton in response to variations in temperature and humidity.

Other progress has been made toward the ultimate standardization of certain character elements. With the aid of delicate equipment the average weight per fiber-inch is calculated as a measure of fiber fineness, and fiber maturity, strength, and length uniformity are being determined. These accomplishments mean that a long step has been taken toward obtaining the data for establishing the relationships between some of the character properties of the raw cotton and quality of the manufactured products. It should now be possible to devise and test more rapid methods for the recognition and measurement of these properties in raw cotton with a view to providing the practical basis of comparing samples against any character standards or specifications that may be developed.

COTTON-FIBER LENGTH, FINENESS, AND STRENGTH

Relationships between fiber length and fineness in more than 250 American upland cottons have been studied. Results indicate that fiber fineness can be estimated from the fiber length alone with an average error of only about 10 percent. About one-third of this disparity is associated with underdevelopment or overdevelopment of the cotton-fiber wall, presumably due to varying conditions of growth. These facts suggest that a method of selecting cottons of different degrees of fineness may be based largely on a knowledge of fiber length.

A compilation of yarn-skein size and strength observations in relation to staple length shows that on the average about 70 percent of the variations in skein strength for a given count of yarn is associated with staple length. Presumably, differences in the "character" properties of the cottons account for a large part of the 30-percent failures. The study has furnished one basis for establishing the comparative spinning value of different cottons of the same and of different staple lengths.

MEASURES OF WASTE IN GRADES OF COTTON

Waste removed during the manufacture of carded yarns from more than 300 selected American cottons has provided the most comprehensive information on the relationship of waste to the spinning quality of cotton. The findings in this study, carried out in cooperation with the textile school of Clemson College, refer both to total waste and to 6 different kinds of waste, and are expressed as the averages and ranges of percentages for each of 8 universal grade standards. The average percentages, for the manufacturing set-up employed, ranged from 6.1 for Strict Good Middling to 15.2 for Good Ordinary, the steps increasing as the grades became lower. It was found that the ratios of the different kinds of waste removed from cotton of a given grade depend to a large extent on the grade.

ACCURATE COLOR AND LENGTH MEASURES APPLIED TO STANDARDS

Copies of the cotton standards prepared for distribution to the public are selected with the aid of laboratory measurements. In the case of the grade standards, copies are examined by means of a special colorimetric instrument which permits finer distinctions of color than is possible with the eye alone. In the case of the staple-length standards all bales used for copies are tested by means of samples drawn from each side and the center of the bale. Portions of these samples are "arrayed" into length groups representing the different fiber lengths and the proportion of the different length groups is determined. Thus a more refined measure than is possible by stapling methods is obtained. In this way the Bureau is able to obtain a greater degree of accuracy in the standards, copies of which it supplies to the public.

The Bureau's laboratories have cooperated in developing and making available to the public a new, very compact, and practical instrument for use with the method of color measurement developed in its laboratories for various agricultural and other products. Charts for conversion of disk areas to colorimetric terms have been completed for several series of colors, and careful physical measurements of these standard colors have been made. The new instrument, together with another one already available, and the work on standardization of disk colors for use with these instruments, now make the disk method of colorimetry practical to many research workers.

Laboratory measurements of thousands of cotton samples have revealed that, for a given grade designation the color of the samples taken from the gin box differs from those taken from the press bale presumably because of differences in density of fiber mass. Heretofore Federal cotton classers have had to make mental adjustments or interpretations in formulating their grade designations, for the different types of samples, without knowing the precise relations. Conversion charts have recently been completed whereby, on a basis of color, gin-box samples can now be compared in the laboratory more accurately with bale samples and with the grade standards. The application of this development contributes to improvement in the grade standardization and classification work.

SEED-FIBER ATTACHMENT IN RELATION TO GINNING

It has been found that the tenacity of fiber attachment is associated not only with variety but also with maturity of fibers, fiber fineness, and fiber length. The strength with which the fibers cling determines the degree to which they are tangled and broken during the ginning process. It may also vary with different growth conditions. The strength of fiber attachment has been observed to vary at different positions on the seed. These variations suggest a partial explanation for some of the varied ginning effects, and the varied quality of the resulting ginned lint. Although it has been known in a practical way from early times that the tenacity with which cotton fibers adhere to the seeds is an important factor in ginning, affecting both the efficiency of ginning and the quality of the ginned lint, yet, for unexplained reasons, little if any careful investigation has been made of this subject. Attention is being given to this problem in order to achieve more efficient ginning and improvement in the quality of American cotton, through cotton breeding and production, for it is evident that there is an opportunity for cotton breeders to breed into their varieties "ginnability" as well as "spinnability."

EFFECT OF GINNING OPERATIONS ON QUALITY

Excellent progress has been made in the studies of ginning, carried on jointly with the Bureau of Agricultural Engineering. Three manuscripts reporting the analyses of data obtained over a series of years are being prepared.

Attention has been centered principally on the problems of greatest concern to growers and ginners, such as the influence upon the quality of ginned lint of saw speeds and seed-roll densities, excessive moisture in the seed cotton, and use of cleaning equipment.

The character and value of this work are illustrated by several findings. It has been popularly believed that one of the most prolific causes of damage to ginned lint is the relatively high rate of speed at which gin saws are usually operated. The laboratory finds that the speed of saws within reasonable limits is relatively unimportant. But the rate at which seed cotton is fed to the gin and the consequent density of the seed-cotton roll affect materially the quality of the ginned lint, yet this condition has received comparatively minor attention. Use of the tight seed roll in ginning substantially increases the capacity of a gin but only with a reduction in quality of the ginned lint and at the expense of the farmers.

Moisture studies have yielded information of great value. Excessive moisture in seed cotton has always presented one of the most difficult obstacles to good ginning. In the early approach to the problem, the Bureau of Agricultural Engineering designed an effective and low-cost drier, mentioned in earlier reports, which has been commercially built and widely installed. Studies of the use of this drier show that the moisture of seed cotton has a marked effect on the smoothness with which the lint is ginned, successively lower

preparation steps being associated with increases in moisture content. Use of the vertical drier, in conformity with the recommended procedure, will result in ginning equal in quality to that obtained from seed cotton harvested under ideal conditions.

With gins in optimum mechanical condition, drying long-staple cottons of relatively high moisture increased the average monetary value per bale about 8.1 percent, when ginning with a loose seed roll; and 6 percent, with a tight roll. Drying and ginning with a loose roll increased the average value of the same cottons 20 percent as compared with that of corresponding portions, ginned damp or wet with a tight seed oil, as is frequently done in commercial ginning. With short-staple cottons of relatively high moisture, the average monetary value per bale was increased 1.7 percent by drying, when ginned with a loose seed roll; and 3 percent, with a tight roll. The value of these cottons dried and ginned with a loose roll was approximately 5 percent higher than that obtained when portions were ginned damp or wet with a tight seed roll. With gin saws in poor condition, even higher percentages of improvement are anticipated. Seed cottons having a moisture content below 8 percent did not show enough improvement in grade to justify drying.

In the fall months of the 1931 and 1932 seasons, this Bureau conducted surveys of the moisture content of lint cotton at the time of baling to determine the extent to which drying might be profitably practiced. Moisture content of the cotton was then related to available weather data. From these studies, it is estimated that in the ginning season of 1931, a period of relatively little rainfall, 24 percent of all cotton of $1\frac{1}{8}$ -inch staple and longer and 8 percent of cotton shorter than $1\frac{1}{8}$ -inch staple were ginned while too green or damp for the best ginning results. In 1932, a year in which rainfall was heavier in the ginning months, these percentages mounted to 35 percent for cotton of $1\frac{1}{8}$ inches and longer staple and to 20 percent (a total of about 2 million bales) for shorter cotton. In the 10 years preceding 1933, weather conditions in the ginning months resembled those of 1932 in more seasons than they resembled 1931 conditions.

FARM PRICES DO NOT REFLECT QUALITY OF COTTON

Data on prices received by growers on the basis of grade and staple length have been collected and studied each year in selected markets distributed throughout the Cotton Belt, since 1928. The purpose is to determine the extent to which prices received by growers in their local markets vary on the basis of grade and staple length of the cotton, as a means of indicating to what extent the price incentive to growers stimulated improvement in the quality of the cotton produced.

Results of the analyses, which are now available for the 5 years to and including the 1932-33 season, show that prices to growers do not accurately reflect differences in spinning value of the different grades and staple lengths, and that some farmers receive considerably higher prices for some grades and staples than other farmers receive for higher grades and longer staples in the same markets on the same days. These irregularities are attributed to general lack of knowledge of the correct classification and commercial value of the cotton on the part of farmers and many local buyers, to differences in bargaining power of farmers and of cotton buyers, to small volumes of some grades and staples, and to other factors.

On the average, prices received by growers were somewhat higher for the higher grades and longer staples than for the lower grades and shorter staples, but these average premiums and discounts to growers were considerably less than those quoted in central markets. During the 5-year period 1928-29 to 1932-33, inclusive, the average premiums received by growers for the higher grades amounted to only 33 percent of those quoted in central markets and the average discounts for the lower grades amounted to 60 percent of those quoted in central markets. The proportions of central-market premiums and discounts for staple length received by growers were even less than those for grade. The average discounts made to growers for cotton shorter than seven-eighths of an inch amounted to only 5 points during this 5-year period, while central market quotations for thirteen-sixteenths-inch cotton averaged 84 points. Premiums received by growers for staples longer than seven-eighths of an inch averaged only about 17 percent of those quoted in central markets.

Average prices to growers were found to be somewhat higher in selected local markets where the cotton averaged higher in grade and longer in staple than in markets where cotton averaged lower in grade and shorter in staple, adjustments having been made for differences in transportation costs to central markets or to mill towns.

It was pointed out that the failure of the present marketing system to reflect a larger proportion of central-market premiums and discounts in the prices received by growers for individual bales makes it impossible for the growers who can produce the higher grades and longer staples to realize the full benefits for doing so. Therefore more cotton of lower grades and shorter staples is produced than would be true were production better adjusted to mill requirements, and this lowers the competitive position of American producers in relation to foreign producers.

UNIFORM TRADING RULES NEEDED

The purchase and sale of raw cotton in spot markets conform generally to rules which define the terms of contract and procedure. Approximately 30 separate sets of such rules are in effect in each of the principal markets of the United States which employs rules of its own. It has been obvious that procedure in the markets might be more efficient if it were possible to reduce to a single series these numerous and divergent rules. Because of the diversity of interests involved, the problem appeared to be one for a disinterested agency acquainted with the methods and requirements of the market chain from grower to manufacturer and with the conditions special to each major area of the Cotton Belt. At the request of the A.A.A., supplemented by unanimous requests from the trade organizations concerned, the Bureau undertook this task. Existing rules were analyzed and compared, after which a preliminary draft of unified rules was prepared and submitted for criticism to the interested public in a series of conferences in the principal markets throughout the Cotton Belt. A final draft is now being prepared.

LIGHT ON THE QUESTION OF SISAL BAGGING FOR COTTON

A new problem for cotton growers arose during the season with the introduction on a large scale of bagging for cotton bales made entirely of sisal. Objection was soon raised by buyers in farmers' markets, principally on the ground that sisal fibers adhering to the lint impaired the value of cotton for spinning purposes. Growers to whose bales sisal bagging had been applied promptly found themselves penalized from 75 cents to \$2 a bale; in many cases they attempted to recover this amount from their ginners. Gins stopped using sisal bagging and a period of confusion followed, marked by controversy, over the advantages and disadvantages of sisal bagging.

Sisal bagging was offered at low prices compared with other materials, thus offering a possibility of reducing the cost of preparing the crop for market, therefore, upon the request of growers, several State commissioners of agriculture, and others, the Bureau studied some of the major questions involved. American mills were surveyed to ascertain their manufacturing experience with cotton covered with sisal, and spinning tests were made in cooperation with a large manufacturer and with the textile school of the University of North Carolina at Raleigh.

The results of the mill survey indicated no unfavorable results in the use of cotton covered with sisal when opened, carded, and manufactured according to usual mill practices, and the spinning tests developed no significant differences in spinning utility which could be attributed to the type of bagging used. Spinning tests of small lots of card-strip waste, obtained from bales covered with sisal and jute bagging, indicated that the presence of sisal and jute fibers did not affect the spinning behavior of such material when spun into a coarse yarn (No. 6s count or coarser). However, tests of card-strip waste spun into a finer yarn (No. 12s count) indicated that sisal fibers affect the spinning behavior of the material. In view of the small quantity of card-strip waste tested it seems desirable that additional tests be made on such material before any final conclusion is reached in the matter.

THE EVOLUTION OF A LAND POLICY

The work in land economics has been directed for a number of years toward formulating a definite, consistent, and unified land policy that will give us

a planned utilization of our land resources according to the uses for which our various types and grades of land are best fitted and with due consideration of long-run public welfare. As stated in the last annual report, a land-use program for the Nation involves a steady retirement of lands least suited for agricultural production.

During the year the A.A.A. established, in its Division of Program Planning, a Land Policy Section, to carry out, as a phase of the Administration's agricultural adjustment program, a coordinated national program for the better use of our land resources. The Public Works Administration allotted to the Federal Emergency Relief Administration an initial sum of \$25,000,000, later augmented by an additional \$12,500,000 for expenditure in the drought area, for the purchase of submarginal lands. The President has requested the preparation, by the newly created National Resources Board, of a comprehensive national report, with recommendations for appropriate action, on land utilization and land policy. To all these enterprises this Bureau is opening the full volume of its resources, making available to them the results of its experience, the conclusions of its research over a number of years, and the services of its trained personnel.

In the field of land values, the results of the annual survey of the farm real-estate situation met, as usual, a steadily widening public response as a guide to action in the unsettled farm real-estate field.

COOPERATION WITH OTHER AGENCIES IN FIELD OF LAND ECONOMICS

Prior to the establishment of the Land Policy Section, several members of the technical staff were detailed for several months to the newly created Division of Subsistence Homesteads in the Department of the Interior to assist in the organization of that division and in the formulation of its policies and programs. At the request of the War Department, the Bureau, through its Division of Land Economics, undertook to appraise the lands embraced within the Fort Peck Dam project. At the request of the State Department, appraisal of the economic damage of smelter fumes to farm property in northeastern Washington was continued and preparations were made for rendering a final report on this important international case now pending for adjudication.

Field work was completed on a comprehensive land-use planning study covering 14 counties in the northern Minnesota cut-over area. The final report, in which the University of Minnesota, other State agencies, and other bureaus of this Department are cooperating, is being prepared. The results are expected to form the basis for action, both State and Federal, for the solution of the acute land-utilization problems in this area. Field work was continued for a similar project in Georgia and the final report, with recommendations, is being prepared.

An economic and social study of the Southern Appalachians, which provides information of great value as a basis for land-use planning in that area, was sent to press. Cooperating in this study were other bureaus of this Department, the Office of Education in the Department of the Interior, and the agricultural experiment stations of the States involved. The report sets forth the facts regarding physical features and conditions, types of land utilization, farm management and organization, occupations and marketing conditions, problems of public finance and farm taxes, schools and education, population distribution and changes, variations in farm-family living, food supplies, and social conditions and organizations. Relationships and effects are indicated whenever practicable and programs of adjustment are suggested.

FARM-MANAGEMENT STUDIES SHOW THE ADJUSTMENTS NEEDED

Recent far-reaching changes in economic situations affecting agriculture as a whole as well as individual farmers, together with the Government program for agricultural adjustment, have raised questions that can be answered only by farm-management research. The work of the Bureau in this field has been directed to uncover new and vital facts regarding the industry and the individual farm. Studies of types of farming, farm management and practice, and means and measures of efficiency of farm organization, have been made for both broad regions and typical localities representative of the conditions to be studied.

TYPE-OF-FARMING STUDIES HELP IN LAND PLANNING

Type-of-farming studies in 10 States were conducted and new work was planned for several other States. All of this work was done in cooperation with State agencies. In these studies, facts were gathered regarding the fiscal and economic factors effecting the success of farmers in each locality.

The type-of-farming study in the State of Washington developed data that are being used as a basis for a new State program of research and land-use planning work. It furnished material for maps showing the several distinct regions of the State and character of farm organizations found in each. A similar survey in Utah covering farm-land ownership and land classification is being used as a basis for a new land program in that State. As rapidly as data become available they are utilized in the State programs of extension work for they enable the extension specialists to adapt their efforts to the specific needs of individual farmers in the light of their individual problems.

These studies provide the working understanding of agriculture of the locality or State in terms of the characteristics of individual farms that make up the industry in that locality. Including agriculture as an industry as well as farming as an occupation, they are both comprehensive and detailed. The descriptive basis of the studies includes data drawn from the census and other sources, in addition to results of close-up examination of the methods of individual farmers. In the analytic phase the effort is made to explain regional and local differences in the type of farming, by showing the effects of land, climate, and economic conditions, which combine to determine the specific character of the farming of a region. The scope of this work is necessarily very broad because the success or failure of the individual farmer may be determined by peculiarities of land, climate, and local economic conditions, or by factors entirely external to the community.

REGIONAL WHEAT STUDIES SHOW COST VARIATION

A survey of over 2,400 farms in the wheat regions of the Southwest, the Dakotas, Montana, and the Pacific Northwest, has provided facts covering cropping systems, equipment used, practices followed, and use and cost of wheat growing in these diverse areas.

The problems of the wheat growers are as diverse as the conditions under which wheat is grown and the wheat-adjustment problems are as varied as those of the farms. The gathered material reports wheat-farming practices under a wide range of natural conditions and in a wide variety of farming systems. At one extreme is the problem of combining wheat with other crops or of replacing wheat entirely with some other crop. At the other extreme is the question whether wheat can be grown at all with profit.

One problem in the newer wheat areas is that of adjusting acreage to labor and machine power. If wheat sold for 75 cents a bushel an operator of 320 acres in one area could pay operating expenses and machinery depreciation with a yield of 6 bushels, whereas an operator handling 500 to 800 acres could do as well with a yield of 5 bushels.

For well-organized farms the operating cost differs materially in different areas and the average yield and the probability of obtaining yields differ in different areas.

At 75 cents a bushel, a well-organized farm in central Kansas would require 6 bushels of wheat per acre to meet the usual outlay for hired labor, materials, and depreciation on machinery. An 8-bushel yield would allow the farmer to meet these costs and pay 6 percent on his usual farm valuation. Yield records indicate that he can expect the 6-bushel-or-better yield 92 percent of the time and the 8-bushel yield 83 percent of the years. The actual average yield for this area over a 20-year period was 11 bushels. This is a real wheat area. In contrast, in a western Kansas area, with lower acre costs, a farmer requires only a 5-bushel yield to meet operating costs and about 6½ bushels to pay 6 percent interest on the valuation of the farm; but average yields are lower and the hazards are greater. In this area a yield too low to pay operating costs at 75 cents a bushel can be expected about 30 percent of the time and a yield large enough to pay cash expense, depreciation, land use, and something for operator's labor can be expected only about half the time. Such an area, as a whole, is plainly submarginal and wheat production, if continued, must be supported by public relief much of the time.

The study is not only providing a measure of the hazards of growing wheat under semiarid conditions but also is revealing types of organization and methods of operation best fitted to the physical and economic conditions of the area.

FARMERS REPORT INCREASED INCOME

The improvement of farm incomes in 1933 over 1932 was reported in detail by nearly 7,000 farmers, who own and operate their farms, in the Bureau's annual survey. These farmers reported an average cash balance of \$415 available for paying living expenses, debts, and improvements. This compares with the gross estimates of all farms, which was \$408. The income survey of individual farms shows that there was an increase in the inventory value of crops, livestock, equipment, and supplies of \$101 during the year. The estimated value of food products used for the farm family was \$163. These results show a decided improvement of conditions over the year 1932 when the same inquiries showed an available cash balance of only \$257, a decline in the farmer's inventory of \$191, while the value of food used was about the same, or \$161.

SMALL-FARM REQUIREMENTS SUMMARIZED

The interest during this emergency period in small farms, town lots for gardening, and what are known as "subsistence homesteads" created a widespread demand for information on the operation of the small place. In co-operation with the Division of Subsistence Homesteads of the Department of the Interior a publication was issued on Planning a Subsistence Homestead. Widespread use of this publication has demonstrated the growing importance of the small holding as the direct means of livelihood.

FEWER FOLKS MOVING FARMWARD

A marked slowing-up occurred in the migration from cities to farms, this movement during 1933 being estimated at only 62 percent of the corresponding 1932 total. As a result the annual estimate by the Bureau of changes in the number of persons living on farms showed a net gain of 267,000 during 1933 compared with 1,001,000 a year earlier. The January 1, 1934, estimate of the total farm population was 32,509,000.

The extent and general direction of interstate migrations by native-born white persons from 1870 to 1930 are shown on a series of chart maps recently completed by the Bureau for each State (or Territory), based on census data. The expansion of agriculture into the Corn Belt and then farther west, the rapid growth of population in many Mountain and Pacific States, and the drawing power of northern and eastern industry and commerce are clearly shown, and brief interpretive statements are given on the charts.

A study of local government in two western Kentucky counties, from the viewpoints of farm taxation and governmental services rendered to farm people, was completed and will be published by the University of Kentucky, which institution cooperated in the study. The results, among other things, indicate a need for marked changes in fiscal policy if mounting annual deficits are to be stopped before defaulting of debt obligations becomes inevitable. Ways and means of bettering the financial standing of these counties are suggested but upon the assumption that property-tax rates should not be increased.

RESEARCH IN FARM TAXATION

The central point in the farm-tax problem is the undue burden of the general property tax upon real-estate owners and particularly upon owners with meager incomes, such as most farmers and small-home owners. The general property tax has become mainly a real-estate tax, as much personal property, especially the intangible, escapes this tax. The obvious remedies are improvement through governmental economy, improved local government organization, and proper assessment of all property, on the one hand, and on the other an equalization of the tax burden through tax revision that would put a relatively greater dependence on revenue sources other than the general property tax.

Recommendations of this nature were made in June in a report entitled "The Farmers' Tax Problem", published as House Document 406, Seventy-third Congress, second session. This report touches on the necessity of coordination

of State and Federal taxes to facilitate desirable State tax revision, outlines the fundamental nature of the farm-tax problem, and contains much basic information resulting from the Bureau's research. It shows, for example, that total farm property taxes levied in the United States increased from \$256,000,000 in 1913 to the peak of \$668,000,000 in 1929, after which the total declined from year to year, reaching approximately \$457,000,000 in 1933.

In addition, the farmer pays automobile and gasoline taxes, some inheritance, income, and poll taxes, and indirect taxes through higher prices of certain commodities bought and lower prices of some products sold. It is evident from the practical operation of the property tax that a much larger amount of taxes levied on others is shifted to the farmer than is shifted by him to others.

Details of the Bureau's research showed a sharp increase in the real burden of the tax despite the drop in the amount of tax per acre, and the burden of farm taxes in recent years was further indicated by the relation of taxes to both cash and gross income, as shown by the returns from several thousand farms representing all parts of the country, in the Bureau's annual computation of income. Property taxes were shown to become exceedingly severe, especially in a time of depression, because they are not adjusted even approximately to the curtailment in the farmer's income.

FINDING THE FACTS ON TAX DELINQUENCY

A Nation-wide study was conducted in cooperation with the agricultural experiment stations of all the States to determine the extent of tax delinquency and tax sales of farm property. This study was financed by the Civil Works Administration.

Preliminary tabulations show a serious increase in tax delinquency. Indications are that farm-tax delinquency reached its peak in 1932, and then declined in response to reduced property taxes and an increased farm income, brought about by higher farm prices and rental and benefit payments under the Agricultural Adjustment Administration.

Of the total tax levy on all property in 285 predominantly agricultural counties in 9 States, on the date when 1933 taxes became delinquent, 44 percent of the 1932 delinquent taxes and slightly less than 9 percent of the 1928 delinquent taxes remained unpaid. It is evident that a large part of the initial delinquency is paid or otherwise liquidated within a year of the delinquency date.

In areas of poor agricultural land, the accumulation of delinquent taxes is materially greater than in the better agricultural sections, but at the same time it is apparent that causes of tax delinquency must be considered very carefully to avoid erroneous conclusions with respect to its underlying economic, legal, and administrative causes.

FARM-MORTGAGE DEBT REDUCED

Preliminary estimates of total farm-mortgage indebtedness, computed periodically by this Bureau, show a material reduction of from 15 to 20 percent in the volume of outstanding mortgage debt from 1930 to 1933. The rapid increase in the volume of foreclosures, from an average of 15.7 per 1,000 of all farms in the year ended March 15, 1930, to 38.8 percent in the year ended on that date in 1933, is chiefly responsible for the reduction in mortgage debt.

Lending agencies are now in possession of large holdings of land that must eventually be transferred to other ownership. Estimates of the total farm real estate acquired by corporations lending on farm-mortgage security increased from \$294,000,000 as of January 1, 1930, to \$511,000,000 in 1932 and \$770,000,000 in 1933. As farm land values declined sharply during this period, the actual increase on an acreage basis would be proportionately greater.

WHY COUNTRY BANKS FAIL

A study of country-bank policy in Arkansas was conducted in cooperation with the Arkansas Agricultural Experiment Station. Preliminary findings are contained in Bulletin 298 of the Arkansas station, entitled "General Indicators of the Condition of Arkansas Banks", published in May. A more comprehensive report is being prepared for publication.

The banks that failed after 1929 entered the depression with a large portion of their assets in the form of slow and doubtful loans. They had insufficient liquid assets to meet the decline of deposits which followed the drought of 1930. The failure of these banks, including a large chain, shocked public confidence and caused extensive withdrawals from other banks above the withdrawals that resulted from the short crop of 1930 and the declining prices during the depression. These withdrawals caused the failure of additional banks.

Loans used by farmers to produce crops and loans used by local business men to carry on current operations, are shown to be among the most liquid of bank assets. Had the banks used more of their funds to finance the current productive operations of local farmers and business men, and less of their funds to finance the purchase of real estate and the capitalizing of businesses, there would have been far fewer failures among Arkansas banks.

To aid in determining further what makes a good loan for some banks, an analysis of 500 cotton-production loans and 500 livestock loans rediscounted by the Federal Intermediate Credit Bank of St. Louis was made. Tentative findings regarding the specific factors that affect most directly the collectibility of short- and intermediate-term farm loans are being issued.

OUTLOOK REPORTS PROVE USEFUL IN ADJUSTMENTS

Outlook work represents one of the most direct and effective means of co-operation with State college and extension economists in presenting the analysis of the agricultural situation changes and developments. This work is basic to the application of economic facts and analysis to the problems of the individual farmer, and has been utilized to an increasing degree since the program of agricultural adjustment was inaugurated. Not only the annual and seasonal outlook reports have been utilized to a larger extent but there have also been constant calls for special statements at frequent intervals.

ECONOMIC INFORMATION WIDELY DISTRIBUTED AMONG FARMERS

During the 10 years of development of outlook work, the factual basis, including series of statistics, indexes, and analyses, has been digested and published in convenient form for the use of extension and other economists. As a result, the materials with which to do effective outlook work are now much more extensive than ever before. Our work in presenting this material graphically in the form of outlook charts has proceeded; most of the series are now represented by such charts. Tens of thousands of these have been utilized by the A.A.A. in its recent campaigns, in addition to the many thousands that have been distributed annually among extension workers. The objective—to make available the materials with which the individual farmer could better judge the probable changes in the near future—has been accomplished in these publications by a combination of fact and analysis.

Because conditions are constantly changing, the greater part of the Bureau's research in the economic field reaches the public through current reports rather than in permanent publications. Much of our work, therefore, is in the nature of current service which depends for its greatest usefulness upon its timeliness.

ECONOMICS LIBRARY ESSENTIAL TO RESEARCH

The Bureau's library is a research laboratory of economic facts which has been indispensable in the newer activities of the year. Economic workers are served by a trained and experienced staff whose aid in the search for facts, in the great mass of economic literature, greatly expedites their work. Several comprehensive bibliographies have grown out of the work done as a part of the Bureau's research. Among these are one on land settlement which makes available the voluminous literature on this subject, and another comprising a digest of State laws relating to the relief of agricultural indebtedness. Surveys were also made and bibliographies issued of the literature on agricultural relief and on the relation of business and agriculture. The collections, which comprise this library, now form one of the most extensive libraries in the world in the field of agricultural economics. New acquisitions are constantly being made in order to keep up with the rapidly changing conditions in which we live.

REPORT OF THE CHIEF OF THE BUREAU OF AGRICULTURAL ENGINEERING, 1934

UNITED STATES DEPARTMENT OF AGRICULTURE,
BUREAU OF AGRICULTURAL ENGINEERING,
Washington, D. C., September 24, 1934.

SIR: I submit herewith the report of the Bureau of Agricultural Engineering for the fiscal year ended June 30, 1934.

Respectfully,

S. H. McCrory, *Chief.*

HON. HENRY A. WALLACE,
Secretary of Agriculture.

The research work of the Bureau of Agricultural Engineering has always had as its objective reducing the cost of production by economical use of resources, efficient use of power and machinery, the prevention of loss in growing and handling crops and livestock, and the elimination of waste effort in farm practices. It has also aimed to promote the enjoyment of farm living. The general fields of investigation have for some years comprised the conservation and efficient use of irrigation water; the reduction in production costs by draining wet fields and pastures and by removing stumps, stones, and similar impediments to cultural operations; the conservation of soil by terracing cultivated land and filling or checking gullies; the provision of animal shelters and crop storages that give adequate protection and eliminate unnecessary labor in operation; the adaptation of mechanical equipment to the kind and amount of work to be done, in order to eliminate drudgery and perform the work within available time periods and yet avoid uneconomical investment in machinery; and the provision in the farm home of those conveniences that have made urban life attractive.

The necessity for utilizing the special experience of many of the technical employees of the Bureau in the work of the emergency organizations that have been set up under the acts of the recent Congress has been realized, and those employees have been made available for consulting and supervisory service wherever requested.

IRRIGATION INVESTIGATIONS

The Bureau of Agricultural Engineering is the only agency of the Federal Government authorized to carry on research work regarding irrigation principles and practices. This Bureau does not construct irrigation works on Government projects or elsewhere, except such experimental structures as may be required for its research activities. It aids farmers of irrigated land by developing research data relating to storage and conveyance of water, requirements and practices in the application of water to crops, and customs, regulations, and laws affecting irrigation. The objective of the work is to retain in cultivation those irrigated lands already developed that will make economic home units, to determine which farms and areas are marginal or submarginal or for other reasons not worth the expense and effort of irrigation, and to maintain the civilization already established as a result of such farming. In any land-utilization program such as now must be undertaken in the West, the prime essentials are a supply of available water and its effective use.

UTILIZATION OF WATER

Nearly all the available surface-water supply in the West has been appropriated, and the high cost of irrigation water now being delivered to many farms has had a marked effect upon the amounts used in the production of crops and has considerably influenced the course of agricultural development. Early practices in irrigation permitted extravagant use of water, to the detriment of both soils and crops, but for many years the fact has been recognized that advancement along both agricultural and industrial lines throughout the West generally depends primarily upon making most efficient use possible of the available water supplies. In most parts of the western half of the United States the natural supplies are exceedingly limited as compared with the potential demands. Investigations are therefore being conducted to determine ways and means by which waste of water can be avoided and the available supplies put to the most beneficial uses. These studies include, among other things, the determination of the most economical requirements of irrigated crops, penetration and conservation of precipitation, replenishment of ground-water supplies by spreading, drainage of water-logged areas, losses by evaporation and transpiration, reduction of reservoir capacity by silt deposition, and noneconomic uses of water.

CONSUMPTIVE USE OF WATER

Investigations conducted in lemon orchards near San Dimas in southern California in cooperation with the Bureau of Plant Industry indicate that, under certain conditions, it is possible so to regulate the amount of water applied and the time of application as to produce fruit of the most profitable size and quality and to increase the amount of marketable fruit in the summer when the demand is greatest. The work should be expanded to include grapefruit and oranges. By a special investigation made at Corona, the fact was established that there is a ready cross transfer of sap throughout lemon trees so that any root may deliver soil moisture to any branch. This has led to an increasing use of the practice of irrigating in alternate furrows, thus reducing labor and evaporation losses. Improved methods of applying water resulting in increased efficiency and economy have been devised and are now being used by farmers. Studies carried on at Bard, Calif., in which accurate measurements were made of the amounts of water applied to various crops raised in specific rotations and irrigated in accordance with a program approved by this Bureau, produced the following results: Alfalfa yielded 10,388 pounds of hay with the application of 71 acre-inches of water; cotton 1,285 pounds of seed cotton with 48 acre-inches; milo 1,249 pounds of grain with 31 acre-inches; and winter wheat 2,156 pounds with 22.5 acre-inches.

Investigations are being carried on in a number of districts in southern California to determine the contribution to the ground-water supplies made by rain falling on valley floors, and the consumptive use of water by plants growing both on irrigated and on unirrigated lands. These investigations indicate that the mean transpiration rate during the winter period for all normally growing agricultural crops is about 1 acre-inch per month and that on bare land, in vineyards, and in clean-cultivated deciduous orchards there are no serious losses by transpiration during that season. The mean winter evaporation-transpiration monthly rate of loss for grass and weed-covered land appears to be about 2 acre-inches per acre and that for brush-covered land about 2.4. The data obtained indicate that penetration extended below the root zones of all the shallow-rooted crops irrigated regularly during the summer months, much of the deep penetration occurring in areas devoted to citrus. In areas having normal rainfall, deep penetration occurred also in irrigated orchards of deciduous trees. In the areas covered by grass and weeds, deep penetration did not occur when the rainfall was less than 20 inches.

Further studies have been made at Devil Canyon, in cooperation with the California Forest Experiment Station and the municipal water department of San Bernardino, with a view to obtaining data regarding evaporation and transpiration losses of water occurring during the growth period in a typical small canyon, and regarding the additional water that would be obtainable if diversion were made higher up on the stream. The average daily rates of loss by evaporation and transpiration during the three growing seasons of 1931, 1932, and 1933 along about 3,600 linear feet of canyon above an altitude of 3,100 feet were 0.23 acre-inch for May, 0.33 for June, 0.58 for July, 0.61 for August, 0.56 for September, and 0.41 for October. On the basis of these values,

the computed combined loss of water through evaporation and transpiration in that section of the canyon for the 6 months constituting the growing season was 83 acre-inches, or 23 acre-inches per 1,000 linear feet of canyon.

At several points in southern California, this Bureau and a number of other organizations have been keeping records of evaporation. Some types of evaporation pans used differ materially from any used by the Federal agencies, and the results obtained are in some cases not directly comparable. Therefore a cooperative key station has been established at Baldwin Park to determine the differences in rates of evaporation from pans of different types, sizes, and settings, in order that the various records may be correlated. Special evaporation studies are being conducted at Pomona, Prado, and other localities. One feature of the studies at Pomona is the determination of the effect of algae on evaporation, while at Prado a study is being made of the relation of evaporation to the loss of underground water through transpiration by willows and other brush.

Moisture required for the most profitable production by pear trees growing in heavy soil near Medford, Oreg., has been studied in cooperation with the soils department of the Oregon Agricultural College and the United States Bureau of Plant Industry. It has been determined that tree response is closely related to the moisture content of the upper 3 feet of soil and that the yield of pears of desirable size has been increased by maintaining the soil moisture well above the permanent wilting percentage. The results of the study are being published as Technical Bulletin No. 432, now in press. Investigations of the water requirements of other crops are being conducted cooperatively at the Umatilla Field Station of the Bureau of Plant Industry. Studies along somewhat similar lines are being made at Corvallis and other places in Oregon. The studies regarding the relation of crop rotations to water requirements previously initiated in Nebraska in cooperation with the Bureau of Plant Industry are being continued, and additional investigations regarding the utilization of water have been carried on in other localities in cooperation with other agencies. Studies relating to the production of cotton in heavy soils in San Joaquin Valley, Calif., and to the drainage and reclamation of water-logged lands in several of the Western States were continued.

Investigations made near Phoenix, Ariz., regarding water requirements of citrus trees have been continued. It is concluded that, in general, about 70 percent of the moisture used by the trees was drawn from the upper 2 feet of soil and that the fifth and sixth feet furnished little, if any, moisture. It also appears that 70 percent of the total amount used is required in the 6-month period April to September. The assembling of information for a bulletin on wells for irrigation has been continued. Well-drilling methods in several sections of the West have been studied, and plans have been completed for making a model study of wells cooperatively with the Colorado Agricultural Experiment Station. Data are being compiled for a complete revision of Department of Agriculture Bulletin 194, *The Flow of Water in Irrigation Channels*.

UNDERGROUND STORAGE OF WATER

Owing to drought conditions little water was available for the studies to determine the practicability of spreading stream flood flow over gravel areas in order to replenish the ground-water storage for irrigation. Nevertheless, valuable data were obtained at a number of the stations maintained in southern California. A 2-day test made on the experimental plot at Anaheim indicated that an area from which the top 12 inches of silt, deposited as a result of previous water-spreading, had been removed was more than eight times as effective in absorbing water as it was before such removal. The Azusa plots were operated for about 5 weeks, and valuable data were obtained on the effect of fluctuating water tables on the rate of percolation. A cooperative agreement having in view research studies on the Lytle Creek and upper Santa Ana River cones has been entered into. By means of a fund of \$13,500, allotted by the Public Works Administration, four additional stations have been installed in the lower Santa Ana River basin. These will permit the making of accurate determinations of the amounts of water lost by percolation between stations and of the rate of percolation per unit area of river-bed materials. The importance of replenishing the underground water supplies is suggested by the fact that during the past 5 years the water table has fallen as much as 60 feet in some southern California areas dependent upon pumped water.

IRRIGATION CUSTOMS, REGULATIONS, AND LAWS

Technical Bulletin 439, entitled "Policies Governing the Ownership of Return Waters from Irrigation", is in press. This bulletin reports the results of investigations regarding return-flow water from irrigated land in the Western States, and formulates equitable principles concerning rights to the use of return water in jurisdictions in which the constitutions and laws permit the application of such principles. In States where the constitution and laws permit, the following equitable principles, among others, are generally recognized: It is not inequitable to allow a project the beneficial reuse of its return waters provided all other appropriators are fully protected. Beneficial use is achieved when a project effects complete utilization of both its original diversion and its return flow if this can be done without injuring other appropriators.

DESIGN AND INVENTION OF APPARATUS

In cooperation with the Colorado Agricultural Experiment Station experiments with sand traps of different types, mainly the vortex-tube and grating types, were continued. These devices are intended to rid irrigation canals of sand and bed silt. Various designs and settings of vortex tubes were tried with the object of determining the relative efficiencies of different shapes, arrangements, and combinations. After preliminary tests of a variation of this type, one having a lip length of 50 feet was installed in the Fort Lyon Canal, near Las Animas, Colo., with a view to testing the structure under field conditions. Several vortex-tube sand traps have been installed under field conditions in various small irrigation ditches in Colorado. A new type of sand trap, known as "the grating type", was developed tentatively in the latter part of 1933. This consists of a series of vanes set vertically, normal to the axis of the channel, with the top edges turned downstream in the plane of the bed of the channel.

Handling and disposing of the silt carried by the irrigation canals in the Imperial Valley, Calif., imposes a yearly burden of about \$3 per acre upon the farmers there. The information obtained regarding the effectiveness of both the grating and the vortex-tube types of sand traps was so encouraging that plans for experiments at the Rositas Dam on Alamo River, near El Centro, Calif., have been approved as a Public Works Administration project, with a view to studying the possibilities of ridding Colorado River water of its burden of sand and silt. The equipment has been set up and tests will be made when water is available. The Bureau of Agricultural Engineering and the Bureau of Reclamation will collaborate in making the experiments.

A new type of cultivator designed for removing weeds in irrigation furrows with the least possible disturbance of the soil has been developed and is in practical field use in southern California.

SILT IN TEXAS STREAMS

The studies to ascertain the quantities of silt carried in streams, as affecting the life of storage reservoirs, were continued in cooperation with the Texas Board of Water Engineers. Technical Bulletin No. 382, *The Silt Load of Texas Streams*, was published, reporting the investigations made from the commencement of the work till the end of the year 1930.

IRRIGATION IN HUMID REGIONS

The widespread drought has greatly increased the general interest in irrigation in the humid States. This is evident from the fact that during the past year at least three times as many inquiries have been received as in prior years for information and advice concerning installations proposed where the average annual rainfall normally distributed is adequate for crops.

The status of irrigation in Ohio and Michigan was investigated because considerable interest in the subject had been reported in those States. It was found that the relatively new method of porous-hose irrigation was being widely used without a full understanding of its usefulness or limitations. A discussion of irrigation by means of porous canvas hose was prepared and inserted in all unissued copies of *Farmers' Bulletin 1635, Surface Irrigation in the Eastern States*.

Work was started on the development of cheaper devices for the control of irrigation water that would be suitable to the humid regions. The development of devices which are both cheap and practical should lessen the cost of irrigating and make the crop insurance afforded by an irrigation installation more generally available to farmers in the Eastern and Midwestern States.

A portable overhead spray line mounted on wagon wheels instead of posts was developed, and seems to give much promise. With pipe of suitable diameter it is believed that a considerable length can be moved readily from one spray position to the next by two men. If this method proves successful it will markedly reduce the investment in pipe lines usually necessary for an overhead irrigating system. A hose connection from the portable line to a suitable hydrant in the main supply line is necessary. The present equipment uses $\frac{3}{4}$ -inch pipe on the portable line. This size lacks proper stiffness, as is evidenced by too much bending when the unit is being rolled from place to place, and the necessity for using larger pipe is evident.

A flat board outlet or deflector gate was developed for low-pressure surface irrigation lines and subirrigation stop pockets. This device uses sheet rubber, such as may be cut from automobile inner tubes, for making the water seal. It has the advantage of never sticking, as some types of the now commonly used plug gates do.

Work has started on the preparation of a map to show the relative irrigation needs of the different Eastern States. A limited investigation has shown that there is considerable variation in the need for irrigation in localities having equal annual rainfall; this is because of variations in distribution during the growing season. It is anticipated that this map will help to indicate the localities in which average conditions do not warrant the expense of providing irrigation equipment, and also those in which irrigation equipment may be profitably employed.

SEWAGE IRRIGATION

For the past 5 years a sewage experiment farm has been operated jointly by the borough of Vineland, N. J., the New Jersey Agricultural Experiment Station, and this Bureau, in which studies have been made of the disposal of sewage on crops grown in coarse sand. This work was terminated at the end of the fiscal year. Considerable information concerning sewage irrigation in foreign countries was obtained through the courtesy of the Department of State. The following are some of the most important facts established as a result of the studies:

The location for a sewage farm should be selected with care because an unfavorable location may result in failure of the entire project. The farm should be remote from dwellings, the soil should be permeable and well-drained, and if possible the elevation should be such that sewage may be conveyed to the farm by gravity.

The land should be carefully leveled so that sewage will not collect in ponds. With sewage irrigation it is important that the distribution system be so planned that the sewage can be applied to any field for some time without attention, because the flow continues day and night. For this reason field distribution from pipes is preferable to the use of open ditches.

The coarse sand of the Vineland sewage farm is capable of absorbing large quantities of sewage without water-logging or clogging. The sewage flow from a population of 8,000, was applied to $2\frac{1}{2}$ acres for an entire winter without causing water-logging. A measured depth of 20 feet has been applied during the growing season. Where land of this character is available, irrigation is likely to prove a very satisfactory method of sewage disposal.

The crops most satisfactory for sewage irrigation in humid regions are field and sweet corn, alfalfa, Sudan grass, cabbage for poultry, asparagus, egg plant, and sweetpotatoes. No crops intended for human consumption without cooking should be grown on a sewage farm.

A project entitled "advantages and limitations of sewage irrigation in the West" has been initiated, and much of the field work had been completed at the end of the fiscal year. In the use of sewage for irrigation, there is this important difference between the humid and the arid regions: In the East the irrigation is incidental to disposal of the sewage, while in the West treatment of the sewage, though necessary, is merely an incident in reclaiming the water for irrigation.

DRAINAGE INVESTIGATIONS

HYDRAULIC EXPERIMENTS AT THE UNIVERSITY OF IOWA

Manuscripts for two Technical Bulletins—442, Bridge Piers as Channel Obstructions, and 429, Pile Trestles as Channel Obstructions—were completed and forwarded to the printer, and that for a bulletin on Flow Around 180-Degree Bends was submitted for review.

Laboratory work on the determination of losses in bends of various shapes in pipes of 6-inch diameter was discontinued, and analysis of the results was commenced. It was found that bends can be used as flow meters, because for any given flow there exists a constant differential of pressure between the outside and the inside of the bend. The loss of head in the bends varied from about 20 to 100 percent of the maximum value, depending on the cross-sectional distribution of velocity in the water entering the bend.

FREQUENCY OF HIGH PRECIPITATION RATES

The frequencies with which high precipitations of short duration have occurred in different sections of the United States have been determined by the Bureau, in a study financed as a project of the Civil Works Administration.

An intimate knowledge of the rates of excessive precipitation is essential to the successful planning of terracing systems, farm-drainage systems carrying surface water, and culvert waterway openings for small watersheds, as well as other structures for removing storm run-off. The rate of run-off depends upon the rate of rainfall, the period during which this intensity prevails, the percentage of rainfall that flows off, and the time of concentration for the watershed area. The frequency with which certain rates of precipitation recur should be the foundation of intelligent design for structures such as have been mentioned.

Available data relating to excessive precipitations at 206 of the United States Weather Bureau stations in the United States and 2 stations in its island possessions have been summarized and presented in the form of graphs. Formulas giving the maximum rates of precipitation for short periods up to 400 minutes have been derived, and the average frequencies of occurrence of such storms have been computed. In all, 28,077 rainstorms were studied. It is believed that this study is sufficiently comprehensive to afford a basis for the reasonably accurate prediction of the probable precipitation and the frequency of storms lasting 400 minutes or less in any portion of the United States.

Two charts were prepared for each station, one giving the frequency of high precipitation rates and the other showing the duration of precipitations of high intensity. The data show that storms are of much greater intensity along the Gulf of Mexico and the Atlantic seaboard than inland east of the one hundredth meridian. At most stations west of the one hundredth meridian the heavy storms have been much less intense and less frequent than in the East.

Intensity charts have been compiled for the entire United States from the frequency-duration curves for the individual stations. For 5-, 10-, and 20-year frequencies, intensity charts for 5-, 10-, 15-, 30-, 60-, and 100-minute durations were compiled. Iso-pluvials were plotted on a map of the United States to show the variation in rainfall intensity. Graphs were made showing the stations that have similar storm-period characteristics. The number of excessive storms that have occurred in each month, adjusted to a period of 30 years, was determined and shown by charts. Comparison of these charts will show in what month heavy storms are most frequent in any part of the United States.

Miscellaneous Publication 204, presenting the results of this investigation, is in press.

OPERATION OF DRAINAGE PUMPING PLANTS

Studies of pumping for drainage were limited to obtaining records from pumping plants along Illinois and upper Mississippi Rivers, primarily to determine the amount of seepage water to be pumped. Considerable progress was made in working up the records for earlier years. Technical Bulletin 390, Design and Operation of Drainage Pumping Plants in the Upper Mississippi Valley, was printed during the year.

DRAINAGE OF SUGARCANE LANDS

Experiments to determine the effects of drainage and irrigation on sugarcane were continued at Houma, La., during the year. The benefits of thorough and efficient drainage were indicated by the results of 1933. The cane variety, CO 281, is not ordinarily planted on black land because usually such lands are poorly drained. But in 1933 four plots of CO 281 plant cane, on black land having good drainage 2½ to 3 feet deep, gave an average yield of 28.8 tons of cane and 5,470 pounds of sugar per acre compared with a yield of 14.5 tons of cane and 2,720 pounds of sugar per acre on a comparable check plot having ordinary farm drainage. The tile-drained plots had a yield of 5½ tons of cane per acre more than adjacent areas not tiled. The results from the deep-drainage experiments, having drainage depths ranging from 2 to 5 feet, were inconclusive. Good surface drainage and underdrainage 2½ to 3 feet in depth gave about as good results as deeper drainage in 1933.

Cane on the irrigated experiment plots made more rapid growth than the cane on the check plots until about July 1, but the cane on the check plots did better during the latter half of the growing season, and the difference between the yields from the irrigated and the check plots was so small that the irrigation experiments were not continued during 1934.

CONTROL OF GROUND WATER IN PEAT AND MUCK SOILS

Studies of means and cost of controlling ground water in the peat and muck soils of Florida were continued at Belle Glade in cooperation with the State experiment station. A stable ground water is especially important for the costly, shallow-rooted truck crops commonly grown on those lands. Results so far obtained are summarized below:

A levee that is now being built around Lake Okeechobee will permit the maintenance of a higher lake level. This has caused considerable concern over the effect of seepage on nearby agricultural lands. The well readings seem to indicate that the seepage through muck soils is slow and in a horizontal direction, and that underdrainage should be installed if open ditches are more than a few hundred yards apart.

The first cost of tile drainage appears to preclude its installation under present economic conditions. Mole drainage with the lines about 15 feet apart and 30 inches deep seemed to be an economical and effective method of removing excess water. Such drainage should be installed when the water table is below the mole depth. The effectiveness of mole drains can be increased by cleaning them shortly after construction with a stream of water forced through them by means of a portable pump. The drop in the water table was about three times as rapid in a mole-drained plot at the experiment station as in the undrained check plot.

Records of operation from several drainage pumping plants indicate tentatively that a pump capacity of about 1 inch depth of run-off per 24 hours from districts several thousand acres in extent will be satisfactory for land growing sugarcane, and that a pumping capacity of about 4 inches per 24 hours from areas of but a few hundred acres will probably be required for high-priced truck crops. The depth of run-off pumped from the experiment station tract of 160 acres amounted to about 8 feet for the calendar year 1933.

Evaporation records indicate that the evaporation from bare soils averaged 0.12 to 0.15 inch per day.

Studies of the subsidence of muck soils in a typical field showed that the soil had subsided almost 5 feet during the 21 years since it was originally drained. The subsidence has amounted to about one-half the original thickness of the more shallow layers of peat. Burning of the peat has considerably affected the amount and rate of subsidence. In order that large areas of the Everglades may be used profitably for agriculture, it is necessary that the total amount of subsidence of the peat soils shall be limited or that the rate of subsidence be very slow, and both amount and rate have been much greater than was anticipated in earlier surveys.

SOIL-EROSION CONTROL

Experiments designed to improve the practice of terracing constitute the major part of the engineering investigations being conducted on the 10 Department of Agriculture soil-erosion experiment farms. These experiments

are intended primarily to obtain information on the proper spacing, grade, height, cross section, and limiting lengths of terraces for any particular soil or land slope. Studies are also being conducted on the methods of constructing and maintaining terraces; the improvement of machinery for building terraces; the proper size, location, and control of terrace-outlet ditches; and improved methods and machinery for farming terraced lands. Other studies relate to the design and construction of check and soil-saving dams for the control of gullies and terrace-outlet ditches. The soil-erosion experiment stations are operated in cooperation with the Bureau of Chemistry and Soils and the respective State agricultural experiment stations. These stations, in the order of their establishment, are located at Guthrie, Okla.; Temple, Tex.; Hays, Kans.; Tyler, Tex.; Statesville, N. C.; Bethany, Mo.; Pullman, Wash.; Clarinda, Iowa; LaCrosse, Wis.; and Zanesville, Ohio.

GENERAL RESULTS

Some of the outstanding results that have thus far been obtained at the several soil-erosion experiment stations may be stated as follows:

Terraces materially reduce soil-erosion losses, the losses from terraced land in terms of the losses from unterraced land ranging from 3.4 percent at the Guthrie station to 22 percent at the Pullman station.

Soil-erosion losses increase appreciably with the grade of the terrace, and it is believed that in most practical terracing work a grade of 4 inches per 100 feet should not be exceeded.

Level terraces are more effective than graded terraces in conserving both the soil and the water, but damage to crops resulting from excessive wetness often occurs on impermeable soils in level-terrace channels, and level terraces require more care in construction and maintenance than graded terraces.

Both soil and water losses are greater for uniform- than for variable-graded terraces. The flatter grades near the upper end of a variable-graded terrace tend to hold back the upper water until that below has time to flow off. This reduces the concentration of run-off water near the outlet end of the terrace, so that a lower terrace embankment can be used for a variable- than for a uniform-graded terrace under the same field and rainfall conditions.

Soil losses increase with length of terrace, making it desirable to use short-length terraces as much as possible.

Soil losses increase with increase in terrace spacing on cultivated land. However, sufficient data have not yet been obtained to determine, for terraces on different ground slopes, the spacings that are best from the standpoint of both erosion control and water-carrying capacity of the terrace channel.

Not much dependence can be placed upon grain crops, such as wheat, to control erosion. During the growing season erosion is appreciably checked by such a crop, but heavy erosion losses are liable to occur from the time the seed bed preparation begins until the crop is large enough to minimize erosion.

EXPERIMENTS AT GUTHRIE, OKLA.

Guthrie is representative of the Red Plains soil region comprising approximately 36,000,000 acres in central and western Oklahoma, north-central Texas, and south-central Kansas. Preliminary results show that in this area nearly all cultivated lands having more than 8-percent slope and badly eroded lands with slopes as much as 6 percent should be reseeded to grass for pasture purposes. Cultivated lands on slopes of more than 1 percent should be properly terraced as the first step in erosion control.

Comparison of the losses of soil by erosion from terraced and from unterraced lands demonstrates conclusively the great value of terraces as conservers of soil. It was found that terracing is the most effective method of controlling erosion on cultivated lands. Contour farming should usually be used to supplement terracing and winter cover crops such as wheat, rye, vetch, and Austrian winter peas help to prevent erosion as well as add considerable organic matter to the soil. Strip cropping supplementary to terracing, using strips of control crops such as wheat and oats between strips of corn or cotton, was found desirable where the soil was exceedingly erosive, where ground slopes were unusually steep, and where terraces were small or terrace spacings were large. When practicing strip cropping it is advisable to place the row crops on the terrace ridges and in the channels so that the capacity of

the terrace channels will not be lessened, and the control crops between the terraces in order to reduce erosion there.

The average annual soil loss for 3 years was 64.1 tons per acre from an unterraced area, which is 29 times the average annual loss of 2.2 tons per acre from a terraced area on which soil and slope were practically the same and crops were essentially the same. The average rainfall for the period was about normal.

Soil losses increase with increase in terrace spacing when the land is planted to a clean-cultivated crop such as corn, as shown by the records of 1931 and 1933. Measurements for 1932, when the land was in oats, showed very small differences in soil losses for the different spacings. Run-off in percentage of rainfall and soil loss in tons per acre were approximately twice as much from terraces on a severely eroded field as from similar terraces on non-eroded land.

EXPERIMENTS AT TEMPLE, TEX.

The experiment station at Temple, Tex., is located in the Blackland Prairie which occupies several counties in east-central Texas. Erosion has caused serious losses, as may be observed in many fields where the black soil has been denuded to expose the lighter colored subsoil. This has caused a serious reduction in fertility, and is the principal reason for a large decrease in average cotton yield which has occurred in this area over a 25-year period. The loss of fertility is shown also by comparison of the yields from different terraced plots. In the upper part of the field the fertile topsoil had been largely washed away and the yield of corn was 24 bushels per acre. Half-way down the slope the terraced plot yielded 30.4 bushels per acre, and at the foot of the slope, where erosion of topsoil was less serious, the yield was 34.4 bushels per acre. Widespread use of terraces together with contour farming and cover crops will be necessary to save the remaining topsoil and bring back a reasonable degree of fertility.

In an experiment to compare two fields, one cultivated parallel to the terraces and the other across the terraces, observations after a 4-inch rain on September 10, 1933, indicated that running the rows parallel to the terraces is preferable to the other method. Several of the terraces were overtopped by the run-off water where the rows crossed and considerable soil was deposited in the terrace channel, whereas in the terraces with rows parallel there were no breaks and very little soil was deposited in the terrace channels. The amounts of run-off and erosion have been very small at the Temple station for the past 3 years because of subnormal rainfall.

EXPERIMENTS AT HAYS, KANS.

The run-off and soil losses were very small during 1933 because the annual rainfall at this station was only 16.26 inches as compared with an average of 23.08 inches over a 65-year period.

Studies of the operation of farm machinery on terraced land indicate that terraces not less than 30 feet wide and 12 to 20 inches high, with well-rounded cross section and flat top, cause little trouble in farm operations on slopes of less than 5 percent when the terraces are crossed in any direction with farm machinery. On slopes greater than 5 percent the best results are obtained when the crop rows follow the terrace lines on the contour. The one-way plow with 26-inch disk has been found to be an effective and economical implement for maintaining terraces at the time of regular farm operations, no special maintenance work being required.

In subsoiling experiments at this station the land is subsoiled to a depth of 9 to 12 inches every other year, the first subsoiling having been done in September 1929. The effect was to increase the crop yield in 1930 over that of plots not subsoiled, but no effect on yields was noticeable in 1931. Subsoiling was done again in September 1931, and increased yields were obtained in both 1932 and 1933. It is thought that the greater yield in the latter year over that of the check plot probably resulted from the storage of a greater amount of moisture during 1932, which then was available for use by the crop during the dry year in 1933.

EXPERIMENTS AT TYLER, TEX.

The Tyler station is located in the rolling, sandy land of eastern Texas. Large areas in this section are very erosive and crop yields have been consider-

ably reduced. It has been demonstrated that terracing is an effective method of controlling erosion on cultivated lands with slopes from 2 to 8 percent.

Comparison of the soil losses from terraced and unterraced land indicates that about 8 percent as much soil was lost from a terraced area as from an unterraced area. The soil losses per acre for 1933 were 3.4 tons from the terraced area and 41.0 tons from the unterraced area, with gullies controlled by brush dams, both having land slopes of about 7.5 percent. Soil losses from cultivated land were found to increase with spacing of terraces, averaging for the 3-year period respectively 3.68, 5.47, and 5.74 tons per acre per year for vertical spacings of 3, 4, and 5 feet. Soil losses were found also to increase appreciably with the grade of the terrace. The average loss of soil per acre per year during the 3 years was more than twice as much from a terrace with a variable grade of 0 to 6 inches per 100 feet as from one with a variable grade of 0 to 3 inches. That soil losses increase with length of terrace was shown by an experiment where the loss from a terrace 1,700 feet long was more than 36 percent greater than the loss from a terrace 700 feet long.

Both water and soil losses are small from terraced pasture land as compared with terraced cultivated land. A terrace on cultivated land lost 4.74 times as much water and 26.9 times as much soil as a terrace on comparable pasture land. Level terraces with no outlet were not satisfactory even on sandy soil. Due to heavy rains of long duration, four level terraces with closed ends to retain all of the rainfall were badly overtopped and broken, and crops were damaged by the water standing in the channels of these terraces.

EXPERIMENTS AT STATESVILLE, N. C.

The Statesville station is representative of the southern piedmont area extending over large sections of Virginia, the Carolinas, and Georgia. It was in this section that contour farming was advocated by such serious-minded men as George Washington and Thomas Jefferson nearly 150 years ago, and where the Mangum terrace was developed 50 years ago to prevent the formation of gullies and reduce sheet washing.

The studies at Statesville show that about 85 per cent of the annual soil loss occurs when the land is under cultivation. Formerly winter cover crops were advocated as a cure for erosion, but it is evident that unless the land is protected during May to September, erosion will be heavy. The only practical method of controlling erosion on clean-cultivated land during this season is by means of terraces combined with other well-established practices including contour farming, soil-improvement crops, cover crops, and strip cropping. One outstanding result of the experiments is the prevention of 90 percent of the soil loss by terracing. The loss from a terraced field was 2.3 tons per acre compared with a loss of 23.2 tons per acre from an unterraced field. The fields were planted to spring oats and lespedeza was sown among the oats in March.

The cost of terracing average farms in this area ranges from about \$5 to \$8 per acre, or about the cost of one application of fertilizer at the rate usually recommended. The cost of terrace construction varies greatly with the degree of gullying. The experiment fields had numerous washes 12 to 20 inches deep. It was found that it cost approximately three times as much to terrace gullied land as to terrace smooth fields not gullied.

In the study of effect of terrace grade on soil loss, uniformly graded terraces 1,200 feet long showed for the year 1.48 tons per acre loss for a grade of 3 inches per 100 feet, and 2.71 tons for a 6-inch grade. A level terrace with open ends showed a soil loss of but 46 percent of that from the terrace with 3-inch grade, but the water that ponded above the terrace interfered with farming operations and reduced crop yields.

Considering both effectiveness and cost, it is believed that terraces spaced 5 to 7 feet apart vertically are most satisfactory for ground slopes exceeding 7 percent on this soil. Additional experimental results will be required to determine the most satisfactory spacing of terraces for all slopes.

Plowing with tractors on terraced land was generally satisfactory although there was some difficulty due to long turns being necessary at the ends of rows. Disc plows were more effective than moldboard plows for penetrating the very hard soil and avoiding breakage by the many roots, stumps, and stones. Crop rows running parallel with the upper terrace, so that short rows point out into the lower terrace, are best adapted to both tractor and horse farming.

The rate of filling behind check dams in the larger gullies has been 2 to 3 feet after a few heavy rains where drainage was from land in cultivated row crops, and only 6 to 9 inches per year from land with a heavy vegetative cover. Where gullies formerly ran dry in a few hours after rains, the dams now pond water for days, augmenting the ground water and hastening the growth of vegetation that further stabilizes the gully banks.

EXPERIMENTS AT BETHANY, MO.

The engineering results at Bethany are considered applicable to a large area in the upper Mississippi and Missouri River Valleys where corn is the principal feed and cash crop. The loss from an unterraced cornfield in 1933 occurred at such a rate that, if continued for only 35 years, it would result in the complete washing away of 7 inches of topsoil. Sheet erosion has so depleted large areas that crops can no longer be grown profitably. Large areas of formerly productive land in this area has been gullied almost beyond redemption, and silt deposits have caused flooding of bottom lands and other damages.

Terraces properly designed and constructed prevent gullying and tend to reduce sheet erosion to a minimum. An unterraced cornfield lost 27.1 tons of soil per acre during the year 1933 as compared with 3.8 tons per acre from similar terraced cornland. The greatest losses on the wheatland occurred during the planting season. The experiments indicated that terraces are needed on wheatland nearly as much as on land planted to cultivate row crops.

An experiment to compare terracing with strip cropping was established in May 1933, and complete run-off and erosion records were obtained during the latter half of the year. The strip cropping did not control erosion in an effective manner, as that area lost 22.1 tons of soil per acre during the 6-month period, which was 7.7 times as much as was lost by the terraced area in the same crops. The corn and peas were planted somewhat later on the strip-cropped area than on the terraced area, but the difference in date of planting could not account for the large difference in erosion.

EXPERIMENTS AT PULLMAN, WASH.

Soil losses increased rapidly with increase in grade of terrace, at this station. For 1933 the soil losses were 1.28, 2.9, 7.2, 10.36, and 13.67 tons per acre for terraces with grades of respectively 0, 6, 12, 18, and 24 inches per 100 feet. From these results it is believed that in the Palouse area, both for satisfactory drainage in the terrace channel and for minimum soil losses, the grade of 6 inches per 100 feet is preferably to the other grades. Level terraces with closed ends impounded water continuously for 4½ months and did not have capacity to hold all the run-off. The average annual soil loss from two unterraced watersheds was 16.8 tons per acre as compared with an average of 3.2 tons from representative terraced areas.

EXPERIMENTS AT CLARINDA, IOWA

Owing to the great lack of rainfall since this station was established, no results of value have yet been obtained. Several miles of terraces have been built, all measuring equipment has been installed, terrace-outlet ditches have been constructed and protected against erosion, and a large number of check dams have been built in the gullies. The soil at this station seems to be much more pervious than at other stations, and this should afford a good opportunity to make helpful comparisons of run-off and soil losses from such soil with losses from the more impervious soils at some of the other stations.

EXPERIMENTS AT LA CROSSE, WIS.

Soil losses on terraced land at this station were only about 7 percent of those from unterraced land, in 1933. Soil losses were found to increase appreciably with the grade of the terrace as at all of the other stations where such measurements were made. Soil losses of 0.6, 2.0, and 7.1 tons per acre were obtained for terraces with grades of 0, 0 to 3 inches per 100 feet, and 0 to 6 inches per 100 feet, respectively. For the year 1933, the water loss in run-off from all terraced cultivated land at this station was 53 percent of that from the unterraced cultivated area under identical farming conditions.

EXPERIMENTS AT ZANESVILLE, OHIO

Development of this station was started about 2 years ago, and no data of a conclusive nature have yet been collected. Usually about 2 years are required before data of value can be obtained, because the disturbed condition of the fields after terracing makes it difficult to obtain comparable results. All installations for the measurement of run-off and soil losses have been completed and some information of value should be collected during the coming year.

FARM-LAND-DEVELOPMENT INVESTIGATIONS

This project has for its object the determination of the engineering improvements needed on typical farms and the benefits to be obtained by making them. The general plan is to make a detailed survey of such typical farms and work out, for each farm, in cooperation with farm management specialists of the State college and the farm owner, a complete development plan in which all elements of the farm business—crops, livestock, power, machinery, buildings, and field improvements—are in proper relation and proportion to each other and to the farm business as a whole. The benefits which ensue from the carrying out of this plan are shown by a comparison of the farm income year by year as the plan is put into operation.

Up to the beginning of this year, 85 farms in Virginia, North Carolina, South Carolina, Georgia, and Minnesota had been surveyed, and a plan had been developed for each. During this year surveys and plans for 8 additional farms in southwestern Virginia were completed, and 20 farms in north-central Ohio were surveyed. The study of these Ohio farms brings out the need for farm reorganization, especially as regards power, machinery, and field conditions. On these farms, which are broadly classed as general-purpose farms, the average size of the cultivated fields is 10.7 acres, with a minimum farm average of 6.2 and a similar maximum of 20.2 acres. The wide variation in the power available on the farms is shown in table 1.

TABLE 1.—*Power available on typical farms in Ohio*

Power per farm	Farms	Cultivated land per farm		
		Average	Maximum	Minimum
	Number	Acres	Acres	Acres
2 horses.....	3	76.7	88.4	73.3
3 horses.....	4	82.0	116.0	43.6
4 horses.....	1	84.6		
8 horses.....	1	282.9		
2 horses and tractor.....	3	129.5	224.0	72.2
3 horses and tractor.....	4	117.0	169.8	97.6
5 horses and tractor.....	1	155.6		

It is hoped that further study of these farms will enable plans to be drawn which will result in decreased production costs by means, possibly, of increased size of fields and better proportions between crop acreage and available power.

Cost accounts are being kept on all the farms, and information as to the benefits received from the adoption of the development plans is slowly accumulating. Many of the landowners have been unable to make much progress with their programs because of the distressed condition of agriculture, but all have expressed themselves as being intensely interested in making improvements as rapidly as financial conditions will permit.

EMERGENCY WORK

The Bureau is acting as consulting engineer to the Federal Emergency Relief Administration on problems dealing with use of water and land in connection with the drought-relief program. The duties have consisted of reviewing various water-conservation projects and making recommendations relative to their feasibility and of making recommendations relative to the construction of structures required for this program.

By request of the Soil Erosion Service of the Department of the Interior, a senior engineer has been assigned to inspect the projects now under construction by that Service and to advise relative to terracing and other agricultural-engineering phases of the erosion-control work.

At the request of the Mississippi Valley committee, an engineer accompanied members of the committee on an inspection of the lower Mississippi Valley in connection with a study of proposed relief projects, and advised with them relative to hydraulic and flood-control problems. At the suggestion of this committee, study of a section of the Missouri River was undertaken to determine whether it would be possible to ascertain flood damages on a typical stretch of river. The field work on the latter investigation was in progress at the end of the fiscal year.

CIVILIAN CONSERVATION CORPS

The Bureau was requested by the Forest Service to act as technical advisor on agricultural-engineering work of the C. C. C., including supervision of gully-control work and minor flood-control projects. This work was commenced in June 1933, shortly after the C. C. C. was established. The object of the work of the Bureau has been to provide instructions and inspection service in order that the work performed by the Corps would be of high engineering standard and economical. To get the C. C. C. camps in operation quickly, several regular employees of the Bureau were assigned temporarily to the work. As soon as new men could be trained for the work, the regular employees were reassigned to their former duties. At present 7 engineers are employed on this work, supervising activities in 14 States, but only 1 of them is a member of the regular Bureau staff.

More than 125 of the C. C. C. camps, averaging about 200 men each, are working on gully-control, water-conservation, and flood-control projects, and a number of additional camps are being established in connection with the drought-relief program. Gully control is the principal type of work being supervised by this Bureau.

The work of the erosion-control camps in the Gulf States district consists largely of terrace-outlet protection. Farmers are required to construct terraces before the C. C. C. men work on the areas. The success of this work is indicated by the number of farmers who are willing to construct adequate terrace systems in order to obtain the benefits of the C. C. C. work, and by the fact that many farmers are duplicating, entirely at their own expense, work being done by the camps.

In connection with the C. C. C. work, the Bureau prepared and issued two mimeographed reports, one giving instructions on methods of gully control and the other on the design and construction of small dams in North Dakota.

FARM-STRUCTURES INVESTIGATIONS

IMPROVEMENT OF FARM HOMES

Work on the improvement of farm homes has been very active. The Bureau of Agricultural Engineering cooperated with the Bureau of Home Economics and the State agricultural colleges in carrying on the farm-housing survey, a project of the Civil Works Administration which covered 352 counties in 46 States. The survey data show that while probably 50 percent of the houses are structurally sound, there are widespread needs for repairs as well as for additions of space and installations of labor-saving modern conveniences. Supplementary data obtained by engineers who examined an average of about 80 houses in each county surveyed indicate that about one-sixth of the 6,250,000 existing farmhouses might well be replaced, and that if all needed repairs and desired additions of space, installations of equipment, and new houses were provided the total cost would be about equal to the value of all present farmhouses. Repairs alone would amount to an average of about \$500 per house. Data gathered by the engineers indicate also that about 40 percent of the farm buildings other than the house are in need of repairs, and that about 35 percent of the farmers visited need new service buildings of some kind.

While the survey does not show that farmers are ready to make improvements on anything like the scale required to meet the needs outlined above—their statements show that they plan to spend on the average only about \$25 per house for repairs this year, and that 250,000 farmers instead of 1,000,000

hope to build houses during the next 3 years—the survey does establish that there is a tremendous deficiency in upkeep and building of farmhouses and other structures. Eventually this deficiency must be made good.

The thousands of appeals to survey workers and by letters to the Department for aid in planning and obtaining better living conditions show more clearly than ever that farm people, especially farm women, generally want better homes. This is the need that the farmhouse-improvement project is trying to meet. As the most logical first step, this Bureau cooperated with the Bureau of Home Economics and State agricultural colleges in preparing plans for better types of low-cost farmhouses. About 100 such plans were prepared with the assistance of architects and draftsmen paid by the Civil Works Administration, who put into the form of working drawings and specifications the experience and ideas of agricultural engineers and home-management specialists familiar with farm needs and conditions. Through the cooperation of the colleges, representing all sections of the United States, a variety of plans was obtained suited to local conditions in all parts of the country. The houses bear the imprint of local architectural traditions and are far superior in appearance to the present average farmhouse. Above all, they are planned to meet the requirements of farm conditions and provide for convenient and comfortable living. Forty of these plans have been selected for publication in *Farmers' Bulletin 1738, Farmhouse Plans*, which will be helpful both to farmers who are planning new houses and to those who are planning to remodel.

A further service is being provided for farmers who wish to build these houses. The working drawings for the use of the builder have been duplicated, and under the building-plan exchange service (p. 22) sets of brown-line prints are being sent to State colleges for making blueprints to be furnished to farmers at a small charge.

Work is also under way to provide material which will aid farmers who are planning to remodel their houses. The farm-housing survey workers collected a large number of plans, cost records, and photographs of houses which were remodelled by the owners, and these are being used as the basis for a bulletin on farmhouse remodelling.

The building situation on the farm is different from that in the city. The farm owner does much of his own building, including hauling the materials, excavating for the foundation, and helping with the carpenter or mason work. In addition, there are some materials found on most farms which need not be purchased. These include gravel, native stone, logs and home-grown lumber, earth suitable for adobe or rammed-earth construction, and waste materials which may be suitable for insulation. At present most farm people are hindered from building the improvements they need by the cost of construction, and there is very little market for any kind of building material or labor. If the farm could supply a larger portion of the material and the building processes could be simplified or better adjusted to the ordinary farm operations, building could proceed faster and the farm market for purchased materials and skilled labor would probably be increased, for some of these materials and services would be needed in almost every building. It is hoped that means of lowering the costs of farm building and at the same time making the structures safer from fire and storm may be found. Studies to discover such means are especially timely, in view of the present shortage of good farm buildings of all kinds.

There is need for a careful study of the location and arrangement of farm buildings. There have been many shifts in land ownership, which have broken up some farm units and thrown others together, and many highways have been relocated for paving. For these reasons, many present farmsteads are badly placed with respect to the fields or the roads, and it would be advantageous to move the buildings to new and better located sites. If this is done, well-planned arrangement of the building group will result in everyday convenience and saving in labor, as well as in improved appearance and reduced fire hazards.

EQUIPMENT FOR FARM BUILDINGS

Tests of modern distillate types of oil burners suitable for use in kitchen ranges, room heaters, and water heaters on farms were completed. A manuscript describing the installation and giving instructions regarding the operation of these devices, and giving tables comparing the costs of oil and other fuels for heating purposes, will appear as Circular 335, *Distillate Burners*.

Technical Bulletin 443, Application of Steam in Sterilization of Soils, was published. This bulletin, based on fundamental research work, shows that low-pressure steam may be used as satisfactorily for soil sterilization as steam at pressures above 100 pounds per square inch, provided the piping system is properly designed. Data for designing the piping are included.

A comparative study was made of the use of pipe-coil radiation and unit heaters for heating a greenhouse at Arlington Experiment Farm, Va. The tests showed some saving in steam consumption and much closer regulation of temperature with the unit heaters, which were controlled automatically by thermostats. However, the saving in fuel was offset by the cost of the electric current to operate the fans of the unit heaters, and there was more difference between the temperatures at floor level and near the roof than when the pipe-coil radiation was used.

STORAGE AND TRANSPORTATION OF FARM PRODUCTS

Work at Presque Isle, Me., in cooperation with the Maine Agricultural Experiment Station and the Bureau of Plant Industry dealt with problems of potato storage, including the control of temperature and humidity in the storage house and methods of handling to reduce losses from bruising. The work shows the value of well-insulated walls, and indicates that 8-inch walls with 4 to 6 inches of fill insulation and protected against moisture are as effective as much thicker walls made up of several layers of material with air spaces between, such as are in common use for potato houses. Plans were prepared for types of storage houses embodying the features described above and arranged for most convenient handling of the stored potatoes. Several recently built storages having walls of the new type will be under observation during the coming winter.

Experiments on handling equipment to reduce bruises resulted in a rope-bottomed hopper which removed dirt, rock, and small potatoes amounting to 5 percent of the weight of the stored potatoes with less bruising than when slatted wood hoppers were used. This has been adopted as standard equipment by one of the large farmers' cooperative organizations.

Simple types of equipment were tested for ventilating and heating ordinary single-walled bins with solid floors, which avoid the loss of storage space incident to using double walls or false floors for ventilation. A removable ventilator duct or trough of about 8 by 20 inches inside cross section, about as long as the bin and with a slatted top, proved satisfactory. It is laid on the middle of the bin floor before filling starts, with one end of the trough extending through the bin doorway into the alley. If the potatoes are wet when stored, some farmers hasten drying by forcing air through the duct into the bin with a blower. The duct is useful also for warming the potatoes by blowing heated air into the bin before they are to be graded and shipped. This practice is helpful because potatoes at the ordinary storage temperature of 40° F. are easily bruised and cut when passed over the grader, but if heated to 50° or more they are less brittle and the amount of injury is much reduced.

When removing potatoes from a bin with the above arrangement, a belt conveyor may be slid into the ventilating duct and the potatoes allowed to roll onto it by removing slats from the top of the trough. There is less bruising of the potatoes when handled by conveyor than when they are moved with fork or shovel.

Measurements of the heat of respiration of fruits and vegetables with the sensitive calorimeter constructed last year were made at Arlington Experiment Farm, Va., in cooperation with the Bureau of Plant Industry. Tests on potatoes, apples, and oranges indicate that the heat released is somewhat less than that calculated from the CO₂ produced.

Several measurements of air circulation in refrigerator cars loaded with fruit in transit were made with an electric anemometer recently developed. The information obtained shows the air movement in various parts of the cars under normal transit conditions and should be helpful in improving methods of handling perishable products both in refrigerated and in heated cars.

Further tests were made on the use of wet shavings in the bottom of the car for protecting shipments of pears during cold weather. Several commercial shipments during the past year used this type of protection with satisfactory results.

A study of mechanical cooling of milk on dairy farms in cooperation with the Bureau of Dairy Industry was completed, and manuscript for a circular on this subject was submitted for publication. The results of these tests show that the operating cost of the mechanical coolers was less than the cost of ice during the summer months. Mechanical coolers also held the desired temperature more steadily and evenly than ice, because when ice is used it is hard to keep a sufficient supply in the tank at all times.

FARM-MACHINERY INVESTIGATIONS

The Division of Mechanical Equipment deals primarily with research and development work in the realm of farm power, machinery, and equipment. In general, such work includes studies of the farm requirements for machinery and the adaptation or development of equipment to meet those requirements. The current investigations consist of (1) analytical studies of methods and machinery for the production of certain important crops, with the ultimate object of finding the most economical and advantageous application of labor, power, and machinery; (2) the adaptation and development of equipment for the effective and economical control of important crop pests and plant diseases; (3) fertilizer-placement studies involving the adaptation or design of machinery or attachments which will deposit fertilizer at a given place with respect to the seed, for maximum yields of various crops; and (4) critical studies of factors involved in the artificial drying of forage crops, applicable to the humid regions, with a view to working out lower cost methods and equipment than now exist. Practically all of the investigations are conducted in cooperation with State or Federal agencies, or both, as it is felt that a more thorough investigation of the subject is thereby possible. In most cases the farm-machinery manufacturers are giving splendid cooperation.

CORN-PRODUCTION MACHINERY

Farmers in central Iowa usually expend from 6 to 12 man-hours per acre in seed-bed preparation, planting, and cultivating corn. With certain combinations of equipment and methods of operation practiced on the agricultural engineering farm at Iowa State College, however, the requirement was only 3 to 5 man-hours per acre, the lower requirement pertaining to listed corn. In 1933 the man-hours per acre ranged from 3.3 to 4.6 and the yields from 70 to 93 bushels. In comparing three different methods of growing corn with 42-inch checked corn, the labor expenditure for preparing the seed bed, planting, and cultivating was about 12 percent less for drilled corn, 22 percent less for listed corn, and 9 percent more for 21-inch checked corn. The yield for listed corn was about equal to, and that for 21-inch checked corn was about 20 percent higher than the yield for the 42-inch checked corn. In the 42-inch surface-planted corn, the 4-row planter and 4-row cultivator were used in combination, the cultivator being mounted on the tractor which pulled the planter. The final seed-bed preparation was thus combined with the planting, thereby doing two jobs at once in a busy season and, by cultivating at the time of planting, giving the corn a good chance to grow ahead of the weeds.

The basin-forming lister-planter attachment developed last year was used this spring in a series of tests at several points throughout Iowa and at two Federal soil-erosion farms.

Results of 3 years' tests with several makes of corn pickers indicated that the most favorable season for machine harvesting in the Corn Belt begins about November 15, but its length varies greatly from year to year. The losses in the various tests ranged from 6.8 to 13.0 bushels per acre, or from 9.1 to 19.3 percent of the yield. The average of ear losses was 4.1 bushels per acre and of the shelled corn 3.1 bushels per acre. With hand picking the ear-corn loss ordinarily ranges from 3 to 5 percent of the yield, which is but little different from that with machine picking.

Time studies showed that, with a yield of 70 bushels per acre, the labor of hauling and cribbing the corn was about twice that of picking with the machine. With the wagon-hitch equipment in common use, about 12 percent of the time was spent in coupling and uncoupling the wagons that hauled the corn, but by use of an experimental telescoping wagon tongue the work accomplished by the crew was increased by approximately 8 percent.

COTTON-PRODUCTION MACHINERY

In the weed-control studies the drag harrow, rotary hoe, and weeder were found to be effective in early cultivation for destruction of annual weeds, but ineffective with perennials such as nutgrass and Johnson grass. A pivoted-axle walking cultivator has been developed for use on hillsides, and tests by a number of farmers in their own fields indicate much promise. This tool is so constructed that the flanged wheel and the control of the pivoted axles permit the farmer to hold the cultivator shovels to the row even on considerable slopes.

The variable-depth planter has been used in 11 locations under a wide range of conditions during the past 3 years, and in only 4 of the 33 instances (11 per year) has replanting been necessary. As 15 to 60 percent of the cotton crop is replanted each year, this planter development should be instrumental in reducing planting costs. An experimental planter was constructed which obtains a variable coverage of the seed by moving the soil in the row instead of oscillating the planting shoe. A two-row experimental planter considerably simpler than the conventional type has been built, and also a hill-drop planter for reducing the hoe labor required with cross-blocking and thinning. The use of disk furrow openers on a cotton planter gave a better stand of cotton and better weed control than use of the same planter without these furrow openers.

That variations in yield of cotton per acre as great as 40 percent may result from differences in type and use of machinery is indicated by experiments. Depth of cultivation is one of the important factors. Deep cultivation reduces yields by damaging the root systems and loosening the soil excessively, and may delay maturity of the crop sufficiently to permit increased bollweevil damage.

A tillage-machinery laboratory is being constructed at Auburn, Ala., with funds allotted by the Public Works Administration. The principal feature of this laboratory are the nine soil bins, each 20 feet wide by 250 feet long, in which experiments will be conducted to determine such things as effect of plow shape and operation upon draft and tillage quality, comparative effectiveness and cost of operation of different tillage implements, effects of soil-moisture conditions upon the tillage and the operation of tillage implements, effects of different tillage implements and practices upon the physical characteristics of the soil, minimum amount of soil manipulation required to obtain best tilth for plant growth, amounts of stresses occurring in the different parts of tillage machines, and degree of wear resistance of various metals and alloys that may be used in tillage equipment. The bins will contain 2-foot depths of representative soils of the Southeastern States ranging from light sand to heavy clay, and will be provided with tight bottoms, drainage, overhead irrigation, and covers to give control of moisture conditions. The bins will be separated by concrete walls, upon which will travel a power car to pull the tillage implements and a car to carry instruments for measuring draft and other stresses. A machinery-storage house and appurtenant operating apparatus are included in the laboratory equipment.

SUGAR-BEET MACHINERY

The use of the mechanical cross blocker for sugar beets worked out last year for Colorado has been extended considerably the past season. Cross-blocking tests were planned to be made in Indiana this year, but because of the drought the beets failed to germinate. Leaflet 97 Cross Blocking Sugar Beets by Machine, was published. Cross blocking in California with the present machine is confronted with a difficulty caused by the peaty nature of much of the soil and the tendency for the cross-blocking knife to pull the plants out by the roots. This has been overcome in a measure.

Because of the difficulty of beet seedlings breaking through crusts formed after a driving rain followed by hot sun, tests have been made with various crust breakers and have resulted in the development of a crust-breaking attachment for a cultivator. This device consists of rolling sections with spikes about 5 inches long so shaped that they break the crust without moving it. Any movement of the crust would shear off the seedling just starting through it.

A start has been made at Davis, Calif., on the construction of a sugar-beet lifter, which, after completion, is to be combined with a topping mechanism to be built at Fort Collins, Colo.

PEST CONTROL

In corn-borer control, work dealing with clean plowing was continued. A number of plows equipped with trash guides devised by this Bureau and for which a public patent has been obtained, and with self-angling disk jointers, were placed in the hands of cooperating farmers and kept under observation. Excellent results were obtained in practically all cases. Tests indicated that the draft of the plows was some 15 percent less with this disk jointer than it was with standard attachments. Application has been made for a public patent on this jointer. The design was worked out for a disk plow fitted with the disk jointers, the purpose of which was to effect better coverage than is now possible with this type of plow, particularly when pulled at the higher tractor speeds. A one-row sled harvester for cutting corn at the ground surface for use in the Corn Belt has been devised, and one adapted for use in New England is now in process of development. These have in general been preferred by the farmers to the low-cutting hoe. Manuscript was prepared for Circular 321 Use of Farm Machinery for Corn-Borer Control in the One-Generation Area, now in press.

In the studies for pink bollworm control the most important development was the further evidence obtained that early plowing immediately followed by irrigation results in extremely high bollworm mortality. Experiments are underway with both a traction and a power duster to obtain a uniform distribution of insecticides over the entire surface of the cotton plant. Further work was done with the push-type cotton shaver in the endeavor to make it more effective, more adaptable, and easier to maneuver.

To combat the Japanese beetle, the Danish rototiller was altered by doubling the number of blades, which gave better soil pulverization without much increase in power requirement, but only slightly increased grub mortality. Work is in progress on the development of effective distributors for lead arsenate, both for mixing it with the soil around the roots of nursery stock and for applying it to the foliage of such stock. A shop and storage room for machinery was built at Moorestown, N. J., with P. W. A. funds, this being a portion of a larger building built by the Bureau of Entomology.

Because of its advantages in pecan spraying, a ball-valve spray-gun cut-off was constructed. This type of valve is used commonly in spray pumps. The self-seating feature seems to have merit in a spray gun, particularly where materials containing foreign matter are handled, and it has performed very satisfactorily in preliminary tests. Because of difficulty in maintaining tight hose joints, a variety of spray-hose couplings were tested and methods of overcoming the difficulty given consideration. As the trend has been toward higher pump pressures in spraying, the problem of maintaining packing glands, valve seats, and bearings is becoming more and more acute. Little work, however, appears to have been done tending toward the use of lower pressures that would make possible the use of rotary pumps. Investigations are under way in this connection, and it is felt that nozzles can be so designed that a satisfactory drive and spread can be effected with pressures not over 150 pounds per square inch.

A burner attachment for a crawler-type tractor was built in Idaho last spring and tried out for pea-weevil control on trap borders of peas about 12 feet wide. A fair measure of control was effected, although it is felt a heavier blast is needed to direct the heat through the rank growth of weeds.

A portable hand-operated burner was built and used against the codling moth in orchards in Indiana. As many larvae of this insect over-winter in orchard debris, effective destruction of a large percentage of the pest can be accomplished by burning. Results last spring were encouraging. Because of the reduced residue tolerance permitted on fruit sprayed with arsenicals, the use of burners as a control measure for certain stages of some insects appears to be very practical. Spraying with atomized low-viscosity oils has been undertaken in a limited way. It is found that a large kill of the pests is obtained if the spray is finely atomized, but if small globules of oil are formed the plant receives serious injury.

FERTILIZER-DISTRIBUTING MACHINERY

Cooperative experiments have been conducted with several crops to determine the most advantageous placement of the fertilizer with respect to the seed or plant. The field experiments have included the application of fertilizer to

beans (snap, lima, and white) at 15 locations in 4 States, cabbage at 1 location, cotton at 13 locations in 7 States, potatoes at 7 locations in 6 States, sugar beets at 6 locations in 2 States, tobacco at 1 location in each of 4 States, and tomatoes at 1 location.

The field experiments to date indicate for all crops studied that under average conditions the rapidity and percentage of germination, early plant growth, time of maturity, and yields are dependent to a considerable extent on the placement of the fertilizer. Placement of relatively large amounts of fertilizer in a narrow band at either or both sides of the row avoided injurious effects on the seed or seedlings and resulted in the largest yields. Placement of fertilizer directly under, above, or mixed with the soil around the seed or seedling roots usually reduced the final stand of plants and resulted in correspondingly lower yields. Exceptions to the general rule occurred in a few instances where small amounts of fertilizer were applied and where highly favorable moisture conditions prevailed during the germination period.

Manuscripts have been prepared for a farmers' bulletin on fertilizer placement and for circulars reporting the placement experiments with snap beans and with cotton.

At the end of 9 months' study of corrosive-resistant properties of bolts, the iron and steel bolts had lost about 9 percent of their weight due to corrosion, and they were broken in an attempt to remove the rust-bound nuts. Galvanized-iron bolts lost an equal weight and were unserviceable after 9 months. Brass, Monel, and Alleghany metal bolts showed practically no loss in weight and no apparent corrosion.

DRYING OF CROPS

The drying investigations this year were confined to forage crops. Alterations that increased the efficiency were made on both the apron-conveyor and the drum-type driers. Changing fan locations and direction of air flow and making other minor alterations on the apron dryer reduced the power requirement from 75 to 55 kilowatt-hours and the fuel requirement from 79 to 53 gallons of oil per ton of dried product. Converting the single-flow drum drier into a reversed-current type, by placing a cylindrical steel shell concentrically within the main drum, reduced the average power requirement from approximately 40 to 33 kilowatt-hours and the fuel requirement from 64 to 49 gallons per ton of dried material.

In tests on commercial driers the total cost of reducing the moisture content of forage from approximately 70 percent to 12 percent ranged from \$4.80 to \$12.35 per ton of dry material, depending on such factors as kind of crop dried, characteristics of drier, and skill of operator. Justification for the expense of artificial drying will lie largely in the price differential between the artificially dried and the naturally cured product. Available information indicates that, particularly in the humid region, artificial drying with the most efficient type of equipment and careful handling is justified.

The most serious problem in connection with artificial drying of forage crops is the high initial investment for equipment. In an attempt to simplify and reduce the first as well as the operating costs, a tower drier supplied with heat from a Dutch oven has been designed and constructed. The forage is fed in at the top of the tower, which is about 20 feet high, and, as it passes downward through the retarding baffles, it is subjected to the drying effect of the rising hot gases. Preliminary results show considerable promise for this type of drier as it is of simple design and construction and has few moving parts.

Crops sometimes are put into storage while they contain a greater percentage of moisture than will permit of safe keeping, with the expectation that the excess moisture will be removed by natural drying in the bins or houses. Therefore tests were made with seed cotton, soybeans, various grains, and hay to determine the effect of atmospheric conditions on the rate of change in moisture content for different methods of exposure.

The data obtained show that the humidity of the atmosphere has a greater influence than the temperature upon the rate of change in moisture content of the crops mentioned. The rate of change depends upon the ratio of exposed surface of the grain or fiber to the moving air. Thus a very thin layer of crop will dry out, or will absorb moisture, much more rapidly than a thicker mass. A layer of wheat even 4 inches thick will dry out so slowly, unless forced ventilation is used, that wet grain may deteriorate before it will become dry enough for safe storage.

SEED SCARIFIERS AND CLEANERS

Further work on scarifiers for legume seed resulted in the development of two machines. One was the barrel scarifier, a simple and inexpensive apparatus for home use in scarifying small lots of seed. The other was the disk scarifier, designed primarily for use by agronomists and by seed dealers or other persons who might have large quantities of seed to scarify each season. These machines have been used for scarifying *crotalaria*, *lespedeza*, and sweetclover seed with very good results. With good seed of high viability, from 50 to 75 percent germination can be obtained on *crotalaria*, at least 90 percent on *lespedeza*, and from 90 to 95 percent on sweetclover seed, with these machines. Unscarified *crotalaria* seed usually germinates from 5 to 10 percent, *lespedeza* from 10 to 20 percent, and sweetclover from 10 to 30 percent. Leaflet 103, *The Barrel Seed Scarifier*, was prepared and is in press.

Stinking smut in wheat usually results from either soil infection or the planting of smutty seed. Soil infection, or the ability of the smut spores to survive in the soil from one season to another, depends to a large extent on weather conditions and is of common occurrence in only a few localities. Materials used in treating seed wheat which are usually effective in killing smut spores adhering to kernels of wheat do not kill all spores in the smut balls. To prevent reinfestation, it is necessary to remove the smut balls before the seed is treated.

Results of tests made on several different types of farm-size fanning mills show that these machines, when properly adjusted and operated, will remove a large percentage of smut balls from seed wheat. Although different makes and types of fanning mills were found to have individual performance characteristics, there appeared to be certain adjustments that should be made with all of them to obtain effectiveness in removing smut balls. A report of this study is being prepared.

RURAL ELECTRIFICATION

A rural electric survey of limited extent was made in 25 States during May and June 1934 with Civil Works Administration funds. The data thus obtained, dealing primarily with the availability, use, and possible extension of electric service to farmers, should be of value for furthering the use of electricity by various agencies. The possibilities of reducing charges, and of extending service through increased use, are promising. The number of assured profit-producing uses on the average farm is limited, and utilization methods which will produce a profit can only be discovered by continued research. A preliminary investigation was made of wind-driven electric plants, which are used to a considerable extent for lighting where high-line service is not available. It is evident that the use most greatly desired of electricity on farms is for lighting.

COTTON-GINNING INVESTIGATIONS

The cotton-ginning laboratory at Stoneville, Miss. has ginned approximately 6,000 lint samples under a wide range of machinery combinations, speeds, and methods of conditioning. Fifty-nine freshly harvested cottons were obtained from Alabama, Arkansas, Georgia, Louisiana, Mississippi, Tennessee, and Texas. The studies have been carried on, as before, in cooperation with the Bureau of Agricultural Economics and the State Agricultural Experiment Station at Stoneville.

Tests regarding effects of the moisture in seed cotton delivered to cotton gins added valuable confirmatory data to the results of previous years, sufficiently extensive to permit the preparation of a technical treatise upon cotton ginning as affected by the moisture content of the seed cotton. Publication of this discussion will make available the first authoritative findings in the conditioning problem, and by summarizing the results of thousands of tests will show conclusively that cotton ginning may be significantly improved by employing the drying process and apparatus developed by the Bureau. The desirability of low temperatures in the drying process was proved, and improvement of \$2 to \$7 per bale, or 6 to 20 percent, in the cotton value as a result of drying was disclosed. The practicability of drying was established by these tests, and it was shown that cotton gins were freer from breakdowns if equipped with a drier, and that driers benefited the farmers materially

by permitting cotton picking to be continued in damp or rainy seasons or in fields of heavy foliage so that the inherent qualities of the crop might be preserved.

The engineers of the Bureau also made certain improvements in drier construction and design, tending to reduce the first cost. Manufacturers have been making extensive sales of factory-built driers, especially in Arkansas and Texas. From available reports of operating driers it has been estimated that during the ginning season of 1933-34 between 60,000 and 100,000 bales of damp seed cotton were successfully dried and thereby improved.

Studies were initiated during the year with the objective of reducing operating and power costs at cotton gins. Although it was found that the energy consumed per unit weight of cotton was virtually constant during the ginning, it seemed probable that the ginning itself could be greatly improved and the sizes of motors or engines be somewhat reduced if the improved methods of ginning were employed, such as using dried cotton and operating with a loose instead of a tight seed roll. In experiments it was found that dry cottons ginned with loose seed rolls required 14 to 43 percent less power than damp cottons ginned with tight seed rolls. Another item of economical significance in cotton-ginning costs is the power consumption of gin fans. Studies upon this problem were begun and another type of fan, heretofore unused in the ginning industry, was obtained for tests during the 1933-34 season.

Studies of gin-saw teeth were undertaken, which included tests of saws with teeth of different kinds and shapes and of various degrees of fineness, to determine the effect of saw-tooth design upon the rate of ginning and the quality of ginned lint. Other features of ginning upon which tests were begun included experiments with air-blast nozzles, new forms of r.b. construction, and development of instruments to observe operating elements of the machinery.

A farmers' bulletin on ginning of cotton was prepared, giving information on present-day machinery and instructions for the correct care, maintenance, and operation of cotton gins in the light of the findings of the cotton-ginning investigations to date.

During the fiscal year 1934 the engineers have been in close contact with all of the cotton-ginning organizations in the United States, and have effectively brought the work of the Department to the attention of the cotton growers, ginners, and manufacturers. A very gratifying cooperation has been extended by these groups, from which it is believed that the cotton farmers will profit in better machinery and practices to suit their local requirements, and consequently in improved ginning.

EXTENSION WORK

The Bureau of Agricultural Engineering cooperates with the Extension Service and the State offices of cooperative extension work in education relating to the following agricultural engineering fields of service:

1. Improvement of fields by means of terracing, drainage, irrigation, clearing of stumps and stones, and the conservation of soil and water upon other land.
2. Utilization of labor, power, and equipment for the production of high-quality commodities at low cost.
3. Farmhouse and farm-building planning to provide alteration and construction recommendations incorporating economically the functional design of farm dwellings, livestock housing, farm-commodity storage, and other farm structures.

4. Farm and home utility information and engineering specifications for lighting, heating, water supply, plumbing, sewage disposal, and mechanical accessories to make farm life less arduous and more enjoyable.

Agricultural engineering extension work conducted by the State extension engineers and other State and county extension workers brings directly to farm people recommendations for improved farm practices based upon the researches and investigations of the Bureau of Agricultural Engineering as well as upon data from other sources within the States. In its extension work the Bureau aids extension field workers in correlating engineering recommendations and in developing methods for acquainting farmers with improved practices. In this manner, during the past year, 1,051,762 acres of terracing and gully-control work upon 38,601 farms was reported by county extension agents. In December a summary of such work for the past 18 years was published in the Extension Service Review. Including the year of this report, over

18,000,000 acres of land upon 600,000 farms have been protected from erosion as a result of extension work, based principally upon over 30 years of engineering investigations in erosion control by personnel of the Bureau of Agricultural Engineering. Cooperative extension records for the past year also report the following results in which Bureau recommendations have played a substantial part: A total of 1,540,217 acres of engineering land improvement upon 59,314 farms; 18,550 farms employing better machinery practices; construction of 28,515 farm buildings and improvement of 19,702 more in conformity with extension recommendations; and 13,964 farm and home-utility improvements installed. An itemized valuation of a portion of the savings effected or service rendered by extension agents in the performance of engineering aid totaled \$6,490,527 during the year 1933.

The farm-building-plan exchange service operated by the Bureau of Agricultural Engineering for the use of State offices of Cooperative Extension Work makes the best farm-building plans produced by the Bureau and the departments of agricultural engineering of State agricultural colleges available to any State office of Cooperative Extension Work. Thirty-three States are contributing designs to the exchange, and 40 States are conducting plans services which make use of the exchange. Several of the colleges have prepared catalogs of the plans which they distribute and placed them in the hands of county agents, home demonstration agents, lumber dealers, etc., where they can easily be consulted by the local farm people. One group of 15 States in the Midwest have cooperated in preparing a printed catalog for use in the entire region. During the past year the Bureau of Agricultural Engineering has furnished State institutions approximately 3,500 brown-line prints of building plans. Operation of the exchange facilitates cooperative national and regional correlation and improvement of farmhouse and farm-building design recommendations, and is of particular interest in connection with the movement for building improvement fostered by the Federal Housing Administration.

In line with its regular extension work the Bureau has aided in emergency activities related to agricultural engineering extension work. In a number of States the extension agricultural engineers have been selected to serve as engineering erosion-control technicians for their respective States under the technical direction of the Bureau in its relation with the Emergency Conservation Work. Extension agricultural engineers also served extensively in the farm-housing survey conducted by the C. W. A. last winter, and are aiding the Bureau in placing new housing designs in the State plan services through the plan-exchange service.

The extension service of the Bureau on request from the Agricultural Adjustment Administration supplied a circular on Erosion Control Upon Lands Removed from Cotton Production, and three circulars on the measurement of wheat-contract acreage which have subsequently been used extensively in checking compliance with the acreage requirements of other crop-reduction contracts as well. The Bureau assisted in conducting demonstrations in the approved method of land measurement in 15 States and aided in the measurement work in 37 States.

SERVICE WORK

A much greater amount of work for other bureaus and agencies has been done during the fiscal year 1934, by reason both of funds allotted by the P. W. A. for construction to increase the Department's facilities for research and of the needs of various emergency-relief agencies for aid in studies and work involving agricultural engineering problems.

The Bureau was charged with the preparation of plans and specifications for all important building projects of the Department, or the approval of minor building construction, and the supervision of construction on the major projects. The work requiring plans and specifications involved 85 projects for erection of which \$1,823,532 was allotted, and required temporary employment of architects, engineers, and draftsmen in addition to the regular staff. The larger works included the following:

For the Bureau of Animal Industry, eight laboratories, power and heating plants, barns, hospitals, a post-mortem building, and storage, shop, and other structures, at Beltsville, Md.

For the Bureau of Plant Industry, a group comprising a horticultural laboratory, cold-storage building, and 10 greenhouses with heating plant, at Beltsville, Md.

For the Bureau of Entomology and Plant Quarantine, 2 laboratories, greenhouses, and 2 mushroom houses, at Beltsville, Md.

For the Food and Drug Administration, a laboratory, greenhouses, and garage, at Beltsville, Md.; laboratory equipment for offices at Atlanta, Philadelphia, St. Louis, and Chicago.

For the Bureau of Chemistry and Soils, a laboratory and office building at the Naval Stores Station, Olustee, Fla.

For the Bureau of Agricultural Engineering, a cotton-fiber laboratory at Stoneville, Miss.; a tillage-machinery laboratory, with shop and equipment, at Auburn, Ala.

In addition to services noted in connection with Emergency Conservation Work (pp. 12 and 13), examinations and reports relating to land use and water resources were made for other bureaus and agencies as follows:

For the Office of the Secretary, an investigation of the extent of the water shortage in the San Joaquin Valley, Calif., and the probability of damage from continued depletion of ground-water supplies for irrigation; a reconnaissance survey of seven typical Mormon irrigation communities in Utah to determine the sufficiency of the agricultural products for the needs of the communities.

For the Bureau of Biological Survey, an investigation of the water supply for the Fallon Wildlife Refuge in Nevada.

For the Farm Credit Administration, a study of agricultural and other conditions in the lower Rio Grande Valley, Tex., to determine the eligibility of the valley lands for Federal farm loans; a similar study of the Imperial Irrigation District and the Coachella Valley County Water District, in southern California.

For the Federal Land Bank at Berkeley, Calif., an examination of irrigation and drainage conditions affecting the Lovelock reclamation project in Nevada.

For the International Joint Commission, cooperatively with the United States Geological Survey, continuation of the study that has been in progress for several years to determine the probable damages to agricultural lands in Kootenai River Valley, Idaho, from a proposed power development near Nelson, B. C.

For the Arizona Agricultural Experiment Station, examination of 20 tracts proposed as possible sites for a subsistence-homestead development.

For the Valley Conservation and Reclamation District, collaboration in reviewing a proposed plan of drainage for the lower Rio Grande Valley, Tex.

For farmers in Kittitas County, Wash., preliminary recommendations covering drainage for about 100,000 acres of irrigated lands in Kittitas Valley.

For Salt Lake City, Utah, a preliminary report upon eliminating sand from the water entering the city mains, installation of a vortex-tube sand trap being recommended.

REPORT OF THE CHIEF OF THE BUREAU OF ANIMAL INDUSTRY, 1934

UNITED STATES DEPARTMENT OF AGRICULTURE,
BUREAU OF ANIMAL INDUSTRY,
Washington, D. C., September 14, 1934.

SIR: I present herewith the report of the Bureau of Animal Industry for the fiscal year ended June 30, 1934.

J. R. MOHLER,
Chief.

Hon. HENRY A. WALLACE,
Secretary of Agriculture.

BUREAU ACTIVITIES OF NOTEWORTHY PROMINENCE

PARTICIPATION IN ADJUSTMENT AND RELIEF MEASURES

During the year covered by this report the Bureau of Animal Industry continued its usual research and regulatory activities and, in addition, performed special services in connection with agricultural adjustment and drought relief. The latter functions comprised chiefly a marked increase of interstate inspections of animals shipped from drought areas to regions of adequate pasture and also augmented meat-inspection duties resulting from an expansion of disease-eradication work and the slaughter of livestock shipped in large numbers from drought areas. The Bureau's forces were reallocated to be of greatest assistance in the emergency. Its man power is so organized as to admit of concentration or decentralization to meet practical working needs. It is noteworthy that the shipment of approximately a million cattle from the drought area to southern pastures would not have been safe had not those southern pastures previously been freed of cattle ticks and the deadly fever which those parasites transmit.

ANIMAL-DISEASE ERADICATION

The persistent campaign to eradicate bovine tuberculosis from the United States continued to progress. A survey conducted in the spring of 1934 indicated that the approximate degree of tuberculosis among cattle throughout the entire country had been reduced to the new low mark of 1.1 percent, as compared with more than 4 percent at the beginning of the eradication campaign. Detailed records of the status of tuberculin testing in every State and county show that more than two-thirds of all the counties in the United States either have completed the practical eradication of bovine tuberculosis or are actively engaged in this important undertaking.

Near the close of the fiscal year, special funds, provided in connection with agricultural adjustment and drought relief, made possible an augmented program of tuberculin testing. In addition, funds were provided for an extensive project to eradicate Bang's disease, also known as infectious abortion, which has been the cause of heavy losses to cattle owners.

Eradication of cattle ticks from the South continued to progress in the three States—Florida, Louisiana, and Texas—which are the only ones of 15 States formerly affected that still contain areas quarantined because of this pest. The year's activities resulted in the release of 13,208 additional square miles of territory, no new areas being requarantined. Tick eradication was

materially expedited through assistance received from the Civil Works Administration, which contributed labor and materials for the construction and repair of more than 4,000 dipping vats in the States mentioned.

Definite progress was made also against other diseases which formerly caused heavy losses. Many years of effort to wipe out the equine malady, dourine, culminated in its apparent eradication. During the year no positive reactions were obtained from blood samples taken from horses in States where the disease had last been observed. Although eradication is considered to be complete among domestic equine stock, there is a possibility that a few wild or semiwild range animals may still be affected. Hence the situation is receiving continued attention. Another horse disease, glanders, also has been practically eradicated. Results of tests for this disease during the last year were entirely negative.

ANIMAL-HUSBANDRY INVESTIGATIONS

As in previous years, the Bureau conducted fundamental research on a wide range of livestock-production studies and cooperated with other Department bureaus, State experiment stations, and extension agencies in correlating the knowledge thus obtained and giving it suitable distribution.

In studies of meat quality, results continued to show the value of good pastures as a part of the ration for cattle and lambs. Experiments with swine indicated that final feed-lot weights of about 225 pounds are associated with maximum quality of the resulting pork, including tenderness, flavor, and richness of juice. With further fattening of hogs, improvement ceased or quality declined slightly.

As in former years, record-of-performance studies showed wide variation in the ability of individual animals to utilize feed and convert it economically into meat and other products. The results show the desirability of selecting breeding stock on the basis of the performance of their offspring. This procedure appears to be the key to the development of superior strains within breeds.

Improved methods of studying wool and other animal fibers microscopically, together with related fiber-measuring devices, provided a basis for advancement in sheep breeding. The same principles apply also to the economical production and improvement of mohair and similar fibers.

In horse investigations, a superior type of utility and saddle stock has been produced by crossing selected animals of the Thoroughbred and Morgan breeds. A Thoroughbred-Percheron cross has given a promising new type of draft animal. The purpose of these studies is the development of systems of mating that produce horse stock most suitable for present-day general utility, pleasure, and farm-power requirements.

PERSONNEL

At the beginning of the fiscal year the Bureau rolls showed 4,407 employees of all grades and designations in Washington, D. C., and in the field. During the fiscal year, 1,026 were added to the rolls, 1,009 by appointment or reappointment, 12 by transfer from other bureaus or departments, and 5 by reinstatement. During the same period 63 employees resigned, 25 died, 14 were transferred to other bureaus or departments, and 74 were retired under the amended Retirement Act of May 29, 1930. Other separations, principally of agents, unskilled laborers, and seasonal and temporary employees, numbered 453, making the total separations for the fiscal year, 629. On June 30, 1934, the Bureau rolls carried 4,804 employees, a net increase during the year of 397.

During the fiscal year 680 additional employees were appointed by the Bureau and assigned to various lines of emergency activities, such as Public Works Administration, cattle-reduction plan, and the campaign to eradicate bovine tuberculosis under the provisions of the Jones-Connally Act.

VETERINARY EDUCATION

During the year 278 students graduated from accredited veterinary colleges, an increase of 31 compared with the number the preceding year. The total enrollment was 1,505 students, an increase of 86 over the number enrolled during the previous year.

The number of accredited veterinary colleges in the United States is now 10 instead of 11, the Georgia State College of Agriculture, Athens, Ga., having

discontinued its veterinary division. There are now 13 instead of 12 foreign recognized veterinary institutions, the Veterinary University College in Brno, Czechoslovakia, having been granted recognition during the year.

PUBLICATIONS, RADIO, AND EXHIBITS

Publications prepared by the Bureau and printed by the Government during the year included 72 new and revised documents. In addition, Bureau employees contributed 156 manuscripts on livestock work and research to periodicals published outside the Department. As in former years, the Bureau furnished the Press Service of the Department with numerous articles on activities of public interest.

As in the past, the Bureau cooperated with the Department's radio service in the preparation and review of a large volume of material for broadcasting over extensive networks. Bureau employees likewise participated personally in radio broadcasts.

In cooperation with the Department's Office of Exhibits, the Bureau furnished subject matter for the preparation of 19 new exhibits and the revision of 17 others. In addition, the Bureau built 2 new exhibits and revised 2 others besides preparing numerous charts, maps, lantern slides, and other pictorial material for which there is an extensive demand. Specialists of the Bureau aided in the preparation of 2 new motion-picture films and in the revision of films formerly prepared.

Results of work by the various divisions of the Bureau are presented more fully in the following pages. In addition, numerous other projects, particularly in research work, are in various stages of progress.

ANIMAL HUSBANDRY DIVISION

The work of the Animal Husbandry Division, consisting chiefly of research in animal husbandry, including poultry husbandry, was conducted under the direction of E. W. Sheets, chief.

ANIMAL GENETICS

An anatomical study of 203 guinea pigs from specially bred strains possessing relatively great genetic differences in body size has shown that the differences existing in weights of vital organs, glands, and other body parts are due largely to general size factors, rather than special group factors. When the data are placed on a percentage of live-weight basis few significant differences exist among the different strains. Although one of the inbred families was, on the average, least variable and the noninbred stock the most variable in weight of different organs and body parts, several crossbred stocks were significantly less variable than two of the inbred families. When there is a constancy of type, such as exists in the guinea pig, relatively great size differences can be effected by breeding methods, but the body parts vary in proportion to the live weight and much of the variability in weight of these parts is retained. Crosses between two inbred strains may show considerably less variability than either strain by itself.

In the case of swine, 1 of the 2 Chester White inbred strains being maintained by brother-sister matings is now in the sixth generation. In this strain there were farrowed during the year 16 fourth-, 117 fifth-, and 29 sixth-generation pigs. For purposes of comparison in these studies, in addition there were farrowed 29 pigs from crosses within this line and 44 outcross pigs by a noninbred boar of the same breed. Litter size averaged 8.8 pigs in the outcross group, 8.0 in the fourth, 7.8 in the fifth, and 7.3 in the sixth generation of inbreds. No significant differences were observed, among these groups, in average birth weights and weaning weights. During subsequent development, however, when the pigs were fed to live weights of 225 pounds, differences in growth were observed. These were apparently seasonal rather than breeding variations, however, as the different inbred generations varied but slightly among themselves in average daily gains. However, fall-farrowed pigs, even when out of the same sow and by the same boar, greatly exceeded spring-farrowed pigs in average daily gain and thus reached the final weight of 225 pounds in from 22 to 36 days' shorter feeding periods.

Recovery of vigor was brought about by outcrossing inbred sows to an unrelated boar. More rapid growth was made by fall pigs, out of full sisters to

sows which farrowed fifth-generation inbred pigs and by an unrelated noninbred boar, than was made by any of the inbred generations. These outcross pigs also showed a tendency to be more uniform in their gains than the inbred pigs. Considerable variation in type and carcass quality existed even in the fifth- and sixth-generation inbred groups, indicating that segregation may still be taking place. Within litters, however, cases of remarkable uniformity were found.

Inbreeding studies with Tamworths, which had been carried through five successive generations of brother-sister mating, were ended because of lack of fecundity. Probably the failure to produce young was due primarily to disease in the herd and only secondarily to weaknesses fixed by close inbreeding. In this study efforts had been made to establish inbred strains from 6 different matings, only 2 of which were successful. These two unrelated strains were in the fourth generation of inbreeding when discontinued. Results show a decrease in size of litter, high mortality among the pigs, slow rate of gain, and a change in type toward that of a lard-type hog.

In special studies with inbred stock, it was found that bilateral cryptorchid boars may in rare cases be temporarily fertile. Results show that cryptorchidism is a sex-limited recessive character. Because boars that appear to be normal may transmit the character and also because sows cannot show it, elimination of the defect from the herd is difficult and can be achieved only by rigid elimination of all parents having affected offspring.

A study of stillborn pigs which occurred among 8,991 farrowed over a period of 10 years at the United States Animal Husbandry Experiment Station, Beltsville, Md., showed that very large and very small litters contain a higher percentage of stillborn young than do medium-sized litters.

ANIMAL NUTRITION

Analysis of meat meals moderately rich in vitamin G, prepared for the Division's poultry investigations, showed that content of this vitamin was not affected materially either by period or by temperature of cooking. Blood meals prepared by the steam- or spray-drying processes showed no difference in vitamin G content. The "stick", a byproduct of tankage manufacture, had a vitamin G content higher than that of the blood meals and equal to that of the meat meals. Again this year, when feeds rich in vitamin G were fed, the eggs produced contained more of this vitamin. Some increase in vitamin G content was found in eggs produced on diets to which had been added whole dry liver or a water extract of liver.

Vitamin E was destroyed or rendered inactive in certain poultry diets containing oils readily susceptible to rancidity. The most pronounced case was with a diet containing rice bran and cod-liver oil.

It was found that the oestrus cycle of rats fed low levels of protein was interrupted to a greater extent on the poorer quality proteins than when adequate proteins were fed.

In a study of the component fatty acids and the fat constants of goat butterfat, its chief difference from cow butterfat was found to be the higher capric and lower oleic acid content. Evidence of the presence of linoleic acid in both goat and cow butterfats was discovered.

Goats' milk was found to resemble cows' milk in possessing a relatively low content of vitamin E. A daily feeding of 40 cubic centimeters of goats' milk to female rats suffering from vitamin E deficiency was inadequate to cause the birth of normal litters.

EXTENSION ACTIVITIES

Extension work in animal husbandry, including meats and poultry, was continued through agreement with the Extension Service and the State agricultural colleges. However, during the year, especially the latter part, duties assigned to the Division's extension representatives in connection with the agricultural adjustment program demanded a large share of their time, and to that extent curtailed regular project activities.

Three major lines of work were stressed because of the economic situation. These were the home production of feed and food supplies, the greater use of pasture and forage crops in livestock production, and the need for greater dependence on horses and mules as sources of farm power.

The meat extension program was designed to furnish assistance to State extension forces and farmers, through the dissemination of information on

the proper handling of pork, beef, and lamb. Demonstrations in slaughtering and in cutting and curing meat were conducted for both county-agent and community-leader groups so that essential training in handling meat would be made readily available to local communities. The increased demand for refrigerated meat-curing facilities throughout the South resulting from this work is developing a wider use, by farmers, of central cold storage for holding fresh meat, poultry, and other perishables for both home use and market. As a result, specially designed cold-storage and canning units are being constructed in many communities.

In poultry extension work the major lines stressed were the importance of poultry in live-at-home programs; farm-flock projects emphasizing the principles underlying efficient production; and demonstrations of a method, developed by the Bureau's research, for determining the sex of day-old chicks.

MEAT INVESTIGATIONS

Investigations of meat and fats were continued in cooperation with the Bureaus of Agricultural Economics and Home Economics and 10 State experiment stations. The Institute of American Meat Packers cooperated also, furnishing material for lard studies.

Further studies on the effects of grass, in the ration, on meat quality again showed the high value of good pastures. A summary of 3 years' cooperative work with the Middle Tennessee Agricultural Experiment Station revealed no material differences in slaughter-animal or carcass grade between lambs fed grain with dams' milk and grass and those receiving the milk and grass but no grain.

A summary of experiments with swine at the Beltsville station showed that as final feed-lot weight increased from about 145 to 225 pounds, with normal increase in degree of finish, there was a small but definite improvement in tenderness, flavor of lean, and quality or richness of the juice of the cooked meat. When the animals were carried to more extreme finish, or to weights of about 300 pounds, however, there was either a decline or no further improvement.

Degree-of-finish studies with cattle were continued in cooperation with the Michigan Agricultural Experiment Station. Preliminary analysis of 2 years' data indicates that with increasing fatness both the intensity and desirability of flavor of the lean and the quality or richness of juice of the roasted meat increase.

Analysis of slaughter-hog grading data showed that such factors as thick finish, wide body, deep body, and plump hams in the live animal are valuable indexes of high grade in the slaughter animal, of decreasing importance in the order named.

Accumulated data on 728 cattle in experiments conducted during the last few years in cooperation with 17 State experiment stations showed the internal fat covering of the ribs to be a good index of carcass grade. This factor was found to be a slightly better index of carcass grade than thickness of external fat over the rib "eye", quantity of kidney fat, marbling of rib "eye", quantity of intermuscular fat, and grain and firmness of the lean meat.

A comparison of two litters each of large-type and intermediate-type pigs, totaling 14 pigs for each line of breeding, showed that with practically equal average final feed-lot weights the large-type pigs had a slightly higher dressing percentage and longer carcass. However, in thickness of back fat, they were exceeded by 20 percent by the intermediate pigs, and in plumpness of ham by approximately 15 percent. The large-type pigs yielded an average of 2.9 pounds more trimmed ham and 2 pounds less bacon than the intermediate-type pigs.

The study of aging cured hams was continued. Representative hams removed from storage after 12 months of aging showed some improvement in palatability over those aged only 7 months, but the additional storage period resulted in about one-third more shrinkage. Cured hams stored in the cooler at about 34° to 38° F. were satisfactory after 12 months, although they did not show the effects of aging so rapidly as those held at higher temperatures.

The importance of feeding meat animals as well as circumstances will permit is indicated by the results of a comparison of 18 sets of weaned twin lambs fed individually, one of each set on a well-balanced grain-and-roughage ration and the other on a roughage-alone (corn silage-clover hay) ration to determine the relative effects on the meat produced. The meat, both lean and fat, of the lambs fed the grain ration had a more desirable flavor and pos-

sessed a more desirable aroma, greater richness of juice, and was more tender than that of the lambs receiving no grain. A similar study with pigs at Beltsville yielded similar results on the flavor of pork.

Results of chemical studies on keeping qualities of lards and other fats used in cooking studies appeared to depend largely on the process of preparation rather than on their composition. Three lards prepared from the fat of hogs fattened on peanuts, corn, and brewers' rice, respectively, and which ranged from oily to hard in consistence, showed no pronounced differences in keeping qualities. A commercially prepared lard, resembling the corn lard in composition, showed better keeping qualities than the above-mentioned three, and an especially refined hydrogenated lard was free from rancidity for a longer time than any of the others. Two vegetable oils, one a refined liquid and the other a solid hydrogenated product, also possessed excellent keeping qualities, the latter product being slightly better than the hydrogenated lard.

Composite samples each of prime steam-rendered, dry-rendered, and kettle-rendered lard, a hydrogenated lard, a hydrogenated cottonseed oil, and a compound made from oleo stearin and cottonseed oil were compared. Hot biscuits were the medium of measuring the intensity and desirability of flavor and of aroma of these fats. The fats which had the least aroma and flavor were kettle-rendered lard, hydrogenated lard, and hydrogenated cottonseed oil. These imparted a more desirable aroma and flavor to the baked product than did the more strongly flavored fats.

BEEF AND DUAL-PURPOSE CATTLE INVESTIGATIONS

RECORD-OF-PERFORMANCE STUDIES

Performance studies were continued with beef and dual-purpose cattle. The wide variations again found in the efficiency with which individual animals utilized feed, in dressing percentages, carcass grade, and tenderness and other palatability factors of the meat, emphasize anew the importance of basing the selection of breeding animals on a demonstration of the satisfactory performance of their progeny.

At the Beltsville station, to reach a finished weight of 900 pounds, individual beef steers required from 373 to 533 days, a difference of 5 months. The average number of days required was 457. Results over a 3-year period indicated that the heaviest calves at birth were the heaviest at weaning time and required less feed per 100 pounds of gain up to that time. They also reached the final slaughter weight in the shortest time. There was, however, no definite relationship between birth weight and carcass grade. Feed requirements from weaning to final slaughter weight were greatest for the heaviest calves at birth and weaning age. Pounds of cold dressed carcass produced for each 100 pounds of digestible nutrients fed ranged from 14.3 to 21.9 pounds and averaged 17.6 pounds for the 3-year period.

In dressing percentage, the animals ranged from 57.1 to 61.5 with an average of 59.6 percent. The animals ranged from low Good to Choice in carcass grades with an average of top Good, from slightly tough to tender in tenderness, and from moderately desirable to desirable in flavor of lean.

When the progeny of four dual-purpose sires were tested, they showed wide variation in gains from birth to weaning per 100 pounds of total digestible nutrients fed. For the progeny of one sire, for example, the gains ranged from 25.9 to 46.5 pounds, whereas for another they averaged from 38.9 to 48.6 pounds. The results of the study show the importance of segregating, through record-of-performance tests, those strains which carry a high degree of efficiency for the production of beef. The data indicate, also, the desirability of locating and using sires that are most efficient in that respect.

Fifteen dual-purpose steers finished on performance tests ranged from 421 to 556 days in time required to reach the finished weight of 900 pounds and from 12.6 to 18.4 in pounds of dressed carcass produced for each 100 pounds of total digestible nutrients eaten. Milk records of the first three females of dual-purpose breeding to complete lactation periods on two milkings per day averaged 9,440 pounds, testing 4 percent of butterfat.

At the Bureau's farm at Middlebury, Vt., cows and heifers of similar breeding averaged 7,864 pounds of milk and 307.5 pounds of butterfat.

In performance studies with Red Polled cattle at the Ardmore, S. Dak., station, representative cows that calved in February produced 4,670 pounds of milk during a 312-day lactation period and similar cows that calved late in August produced 4,080 pounds of milk in a 268-day lactation period.

Average carcass measurements of representative beef and dual-purpose fat cattle showed a greater thickness of meat over the rib ends and through the rib "eye" and chuck in the beef-type carcasses. These also showed larger and plumper rounds. Width through the shoulders and through the hindquarters at the pelvic arch was also greater in the beef-type carcasses. The dual-purpose group had, on the average, greater length of carcass and of leg. When based on carcass weight, little difference was found between the two types in percentage yield of the primary cuts.

BEEF-CATTLE RESEARCH IN EASTERN STATES

For the fifth consecutive year, grazing experiments have been conducted at Beltsville in cooperation with the Bureau of Plant Industry to determine the rate of stocking and system of pasture management that will produce maximum cattle gains per acre of improved pasture of mixed seeding. Differing from the results of previous years' work, in which heavy continuous grazing at the rate of one yearling steer per acre had consistently returned the greatest cattle gains per acre, heavy alternate grazing at the rate of one steer per acre, alternated from one-half of the pasture to the other, this year produced the same gain per acre as did the heavy continuous grazing, 232 pounds in both cases. Light continuous grazing at the rate of one yearling steer to 2 acres, produced gains of only 159 pounds per acre.

For the production of fat calves at weaning time, the practice of feeding a grain supplement, in creeps, to calves running with their dams on good pasture was again shown to be superior to that of fattening, in dry lot, following weaning or that of feeder production, in experiments at Lewisburg, W. Va., in cooperation with the West Virginia Agricultural Experiment Station. With an allowance of 4 acres of high-quality pasture per cow and calf and approximately 500 pounds of a ration of shelled corn and cottonseed cake, in the proportion of 8 to 1 by weight, per calf, fed in creeps for 168 days, calves weighed 528 pounds when weaned at 7.5 months of age and had a farm value of \$5.34 per 100 pounds. Similar calves on the same quality of pasture but receiving no grain supplement weighed only 478 pounds when weaned and had a value of only \$4.50 per 100 pounds as feeders. Other calves of the same quality, on rough mountain pasture at the rate of 8 acres to a cow and her calf, but also receiving no supplement, weighed only 408 pounds at weaning age, but had the same farm value as feeders as the other calves receiving no grain supplement.

BEEF-CATTLE RESEARCH IN THE MIDDLE WESTERN STATES

At Sni-a-Bar Farms, Grain Valley, Mo., in cooperation with the Missouri Agricultural Experiment Station, studies were continued to test the efficiency of various feeds in calf production. Soybean hay was a somewhat more efficient roughage when fed with a limited ration of grain and cottonseed cake to 7-month-old high-grade Shorthorn spring steer calves than was either alfalfa hay or Korean lespedeza, but this may have been due to large quantities of soybeans in the hay. As was the case last year, shelled corn and cottonseed meal produced greater and cheaper gains than did ground corn and cottonseed meal, or either ration with molasses feed added.

In a 3-year comparison of three systems of grazing on 25-acre bluegrass pastures, conducted in cooperation with the Bureau of Plant Industry and the Missouri Agricultural Experiment Station, dividing one pasture into three equal areas and grazing them in rotation produced 97 pounds of gain per acre on yearling beef heifers; continuous grazing of a second 25-acre pasture produced 112 pounds of gain per acre; and, in the case of the third pasture, deferred grazing in the spring, combined with supplemental pasture consisting principally of Korean lespedeza in midsummer, produced 106 pounds of gain, per acre of bluegrass. Each of the three 25-acre pastures was grazed the same number of cattle-days.

BEEF-CATTLE RESEARCH IN THE SOUTH

In the project conducted at the Iberia Livestock Experiment Farm, Jeanerette, La., to study the adaptability of Brahman-Aberdeen-Angus crossbred cattle to the Gulf coast region, crossbred calves born during the year averaged 10 pounds heavier at birth than did the purebred Aberdeen-Angus calves, the weights being 67.8 pounds and 57.8 pounds, respectively. During the year

there were added to this project a few red Aberdeen-Angus females and several registered Angus females for mating with an Africander bull, for a study of the adaptability of this new crossbred type to the region.

A summary of 11 years' grazing records at the Coastal Plain Experiment Station, McNeill, Miss., shows that steers grazed on cut-over, longleaf-pine-land, winter-burned, native-grass pastures made on the average 46 percent greater gains than did similar cattle on unburned areas when grazed at the same rate of stocking. The accumulated "rough" of grass and pine needles on the unburned areas greatly reduced the growth of more nutritious grasses and legumes. Where the stand of second-growth pine was dense the forage growth was entirely eliminated during the course of the experiment. Analyses showed that the grasses on the burned-over areas were more nutritious than on the unburned areas.

For the fourth consecutive year in experiments at Wenona, N. C., in cooperation with the State of North Carolina, grade yearling steers made greater and more economical gains than native yearlings on the same type of fattening ration.

Despite unfavorable feed conditions due to storm damage in the fall of 1933, the value of "crop gleanings" for wintering cows in northeastern North Carolina has been determined from 4 years' data to be 75 cow-days per 100 bushels of yield, or 23 cow-days per acre. The cow herd calving in February, March, and April practically maintained itself on gleanings alone from about January 10 to March 15, and subsequently obtained material subsistence from the acreage grazed, as the supplemental quantity of roughage fed after this time was not sufficient to have maintained weights.

That steers can harvest field crops to good advantage, from the standpoint of satisfactory gains and finish, is shown from an experiment at the Georgia Coastal Plain Experiment Station, Tifton, Ga. High-grade young steers fattened on a field of corn and velvetbeans through the winter and early spring for 129 days made an average daily gain of 1.94 pounds, or a total gain of 200 pounds per acre of feed. The estimated yield of the crop was 22 bushels of corn and 600 pounds of beans per acre. Similar steers fed comparable quantities of corn, velvetbeans, and peanut hay in dry lot made average daily gains of 1.81 pounds per head, whereas those receiving cottonseed meal and cottonseed hulls made only 1.66 pounds' average daily gain. In addition to the saving in labor costs by having the cattle harvest their own feed, these steers carried more finish and accordingly graded higher than the other lots when slaughtered. The steers fed cottonseed meal and hulls showed the poorest condition at the end of the experiment.

A summary of 3 years' grazing experiments at Tifton in cooperation with the Bureau of Plant Industry and the State of Georgia showed, in beef-cattle gains, the value of the development of good pastures by proper fertilization. Results showed that lowland pastures of carpet grass, Dallis grass, lespedeza, and white clover grazed by high-grade yearling steers from early in April to the middle of November returned annual gains of 309 pounds per acre when 600 pounds per acre of a 6-12-6 fertilizer were used; 269 pounds' gain from a similar quantity of 6-12-0 fertilizer; 161 pounds' gain from a 6-0-0 fertilizer; and 122 pounds from an 0-0-6 fertilizer. A carpet-grass pasture, unfertilized, produced only 84 pounds of gain per acre per year for the 3 years.

High-grade yearling steers on Bermuda grass and lespedeza pasture gained 125.7 pounds per acre, the average results of 2 years' grazing experiments on upland pastures at this station showed, as compared with 37 pounds produced on centipede grass and lespedeza pasture. The difference in gains was due primarily to the unpalatability of the centipede grass.

At Summerville, S. C., in cooperation with the South Carolina Agricultural Experiment Station, results of 3 years' experiments to determine the effect of minerals on the breeding qualities and growth of beef cattle indicate a slight advantage in weight at weaning age in favor of those receiving minerals, consisting of 2 parts by weight of precipitated calcium carbonate and 1 part of bone meal.

Herds of purebred Aberdeen-Angus and native cows have been established during the year at the North Florida Experiment Station, Quincy, for production of breeding cattle and veal calves, respectively. Several herds of range cows as well as those at the cooperating field stations at Quincy, Penney Farms, Belle Glade, and Brooksville, Fla., have been graded for breed type, size, conformation, and quality. Most of the native cows graded about 60 percent or low-grade 4 on the basis of a 1-, 2-, 3-, 4-, and 5-point system, 1 being top grade.

BEEF-CATTLE RESEARCH IN THE SOUTHWESTERN STATES

Experiments in Texas to determine the value of locally grown feeds for fattening steers were continued in cooperation with the Bureau of Plant Industry and the State agricultural experiment station. At Big Spring, a summary of 3 years' results indicates that milo heads need not be threshed for steer fattening. When hogs followed the cattle in the feed lot, grinding the milo heads was found to be unnecessary for best results; otherwise this feed gave better results when ground.

At Beeville, Tex., feeding a supplement of 2 pounds of cottonseed cake per head daily to yearling steers on Sudan pasture for 56 days produced no greater gains than were made by similar steers on Sudan pasture alone, but when the supplemental feeding period was 108 days and the cottonseed-cake allowance was increased to approximately 5 pounds per head daily the steers receiving the supplement gained more and showed a marked improvement in finish. Results indicated, however, that the larger quantity of cottonseed cake could probably be fed profitably only when the steers were to be transferred directly from pasture to dry lot for finishing.

That best results were obtained by feeding rice bran only when it did not exceed a quarter of the concentrate allowance was shown in two tests at College Station, Tex. Yearling steers made larger gains in 150-day feeding periods when rice bran made up but 25 percent of the concentrate than when this feed was increased to a third or a half of the concentrate allowance.

BEEF-CATTLE RESEARCH IN WESTERN RANGE AREAS

Studies of the problems of wintering beef cattle on the range have been continued at the United States Range Livestock Experiment Station, Miles City, Mont., in cooperation with the State agricultural experiment station. The year's results indicate that feeding even such a small total supplement as 70 pounds of cottonseed cake per head during the winter was not justified in such an open winter as that of last year. Results of previous years' work, however, showed that excessive losses of weight by cattle on winter range in normal or severe winters can be prevented by small quantities of supplemental feed. When wintered on lightly stocked pastures, 2-year-old cows produced calves slightly heavier at weaning time than were those of similar cows which had been carried on moderately or heavily stocked pastures. Two-year-old steers wintered in the feed lot on alfalfa hay ad libitum gained 28 pounds per head, whereas those wintered on the range with about 1-pound daily supplement of cottonseed cake gained only 3 pounds, and those on range without the supplement lost 45 pounds a head.

A summary of 5 years' grazing results at the Ardmore Field Station, Ardmore, S. Dak., to show the influence of winter rations and gains on subsequent summer gains of 2-year-old steers, indicates that if maximum summer gains are to be obtained the steers should be wintered on but slightly better than maintenance rations so as to gain approximately 35 pounds during the winter period. Sorgo fodder or native range with a supplement of cottonseed cake was more satisfactory for wintering yearling steers than either alfalfa hay and straw or silage and straw. The high value of sorgo fodder as a winter feed, shown by the trials, is important to this section in view of the dependability of the crop in the dry-farming sections.

SHEEP, GOAT, AND ANIMAL-FIBER INVESTIGATIONS

Sheep, goat, and animal-fiber investigations were conducted at 14 Federal and State experiment stations and 1 wool-scouring plant.

FARM-SHEEP INVESTIGATIONS

At Beltsville, Md., the sheep-carrying capacity of mixed crops was again studied, in an attempt to increase the quantity of sheep grazing per land unit over that to be obtained from single crops. A mixed seeding of winter barley and rye furnished 83 percent greater carrying capacity than a 10-year average for rye alone and 29 percent greater than 1 year's results with barley alone. These favorable results conform closely to those obtained last year with a mixed pasture of rye and wheat. Lespedeza, tested as a sheep pasture at Beltsville for the first time, was satisfactory for late summer or early fall grazing and when seeded with Italian ryegrass provided pasture over a much longer growing season than when seeded alone.

A study was made at Beltsville of the comparative weights and grades of Shropshire, Southdown, Hampshire, and Corriedale lambs at the age of 140 days. At this age the Hampshire lambs averaged 65 pounds live weight, the Corriedales 57 pounds, Shropshires 50 pounds, and Southdowns 48 pounds. In slaughter grades, the Hampshires and Southdowns led with an average grade of Good, followed closely by the Corriedales and Shropshires with an average grade of high Medium. These data are being accumulated as measures of breed performance.

At the United States Morgan Horse Farm, Middlebury, Vt., the study on the production of hothouse lambs under New England conditions was continued by mating Dorset and Tasmanian Merino ewes with Dorset rams and Corriedale ewes with Southdown rams. The lambs of both crosses made satisfactory growth and sold well enough to show the possibilities of such production for this section. However, the lamb crop was small because of an abnormally large number of dry ewes. Hothouse-lamb production holds promise for New England conditions provided a type of ewe can be discovered or developed that will breed early enough to produce these out-of-season lambs in satisfactory percentages.

SHEEP RESEARCH IN THE SOUTH

At the Coastal Plain Experiment Station, McNeill, Miss., for the third year sheep-management studies showed that when sheep were furnished extensive pasture range, in connection with sufficient other livestock to utilize the surplus pasturage efficiently, and when the pastures were changed frequently, internal parasites were controlled more effectively without medicinal treatment than they were with frequent dosing when the sheep were pastured on restricted areas. When the sheep were grazed to the capacity of a permanent pasture, internal parasites were not controlled satisfactorily even by dosing each 2 weeks with alternate doses of copper sulphate and Cunic (a copper and nicotine preparation).

RANGE-SHEEP INVESTIGATIONS

At the United States Sheep Experiment Station, Dubois, Idaho, the Columbia breed, developed there, continued to produce heavier lambs and heavier fleeces of greater clean-wool content under the range conditions of this section than did either Rambouillet or Corriedale sheep. Four years' data on rate of gain showed that the Columbia lambs made an average gain each year of slightly more than half a pound daily, whereas both the Rambouillet and Corriedale lambs every year fell slightly below this mark. The data showed further that seasonal precipitation exerted a direct influence on lamb gains, also that there is a close relationship between birth weight and the weight of the lamb at weaning time. Birth weights of several hundred single Rambouillet lambs showed that those weighing less than 9 pounds at birth averaged 75.9 pounds at weaning age; those between 10 and 11 pounds at birth weighed 84.3 pounds at weaning; and those 12 pounds or more at birth weighed 91.1 pounds at weaning.

At Miles City, Mont., a study was made of the comparative effect on the development of ewe lambs intended for breeding purposes, of wintering in the feed lot on a maintenance ration of alfalfa hay and whole wheat and of wintering on the open range without grain supplements. The results showed the ability of ewe lambs, during the following spring and summer months, to recover satisfactorily from the effects of wintering on the open range, although they produced 10 percent less wool.

KARAKUL-SHEEP INVESTIGATIONS

At Beltsville, Md., lambskin fur of real merit was produced by top-crossing purebred Karakul sires on a foundation of Corriedale ewes. The second top cross of Karakuls on a Corriedale foundation produced fur averaging 21 percent better in tightness of curl and 27 percent better in luster than that of the same cross the preceding year. Third top crosses of purebred Karakul sires on a foundation of Black-faced Highland ewes produced fur which averaged 18 percent better in tightness of curl than that produced from second top crosses. Lambskin fur produced from purebred Karakul matings averaged 2 percent better in tightness of curl and 15 percent better in luster than that from similar matings the preceding year. Purebred Karakul fur was both tighter in curl and more lustrous than that of either of the crossbred lines.

STUDIES OF WOOL AND OTHER FIBERS

Shrinkage tests by the ordinary commercial dry-cleaning method on samples of light, medium, and heavy fleeces, taken at shearing time over a 3-year period at Miles City, Mont., showed that, for a given unit of weight, the light fleeces yielded from 1 to 3.5 percent more clean wool than the medium and heavy fleeces. From a commercial standpoint, however, this increase in percentage of clean wool was more than offset by the greater total weight of clean wool obtained from the heavier fleeces. These results substantiate the common practice among range sheepmen of culling on the basis of fleece weight.

By actual test on samples of wool taken from a lot that was later commercially scoured, the shrinkage obtained by the dry-cleaning process now used generally by Department wool experts was found to be practically identical with shrinkages obtained by commercial scouring methods.

In a 4-month feeding experiment at Beltsville, lambs on full feed were found to produce 19 percent greater growth in length of wool than those on only a maintenance ration. The result of this study emphasizes anew the importance of proper feeding methods with sheep.

Tests were made for breaking strength and stretch of the warp and filling yarns of more than 100 samples of fabrics, varying widely in price range and quality, to investigate the merits of new and reworked wool in various combinations. In all cases in which reworked wool or shoddy was present, there was a reduction in tensile strength under that found in fabrics containing no shoddy.

Two public-service patents, one for a fiber holder and the other for a cross-section device for the study of wool fibers, were granted to J. I. Hardy, senior animal fiber technologist for the Department, and assigned by him to the Secretary of Agriculture. The practical application of this equipment in the definition and establishment of standards of wool quality based on actual fiber measurements has been demonstrated.

Further improvements have been made in the cross-section device, which make possible accurate projection of the cross sections upon sensitized paper at a magnification of 500 diameters, by means of a projection microscope, to furnish a permanent record of the cross section. With a transparent measuring wedge designed for the purpose, the distribution of fibers of various diameters can be ascertained quickly. Such permanent fiber records should aid materially in improvement in the quality and uniformity of wool. These cross-section photomicrographs show kemp and medullated fibers as well as the cross-sectional contour of each normal fiber.

MILK-GOAT INVESTIGATIONS

A study with Saanen does at Beltsville to determine the effect, on milk production, of milking at equal intervals of 12 hours instead of unequal intervals of 8 and 16 hours, showed a distinct advantage in favor of the former method. Does milked at the equal 12-hour intervals averaged 1,048.5 pounds of milk testing 3.17 percent butterfat for the period as against an average of only 968.6 pounds of milk testing 2.90 percent butterfat for those milked at the 8- and 16-hour intervals. The two groups tested were similar in production ability as shown by their past records.

Weekly milk records of individual does through complete lactation periods showed a high butterfat content in the milk during the first few days after parturition, in some cases as high as 10 to 11 percent, and a rather rapid decline with increase in the volume of milk. This was particularly noticeable during the first week after freshening and was followed by a more gradual readjustment until the fourth week, when normal butterfat and milk production was obtained.

SWINE INVESTIGATIONS

Type studies were continued at Beltsville with small, intermediate, and large-type Poland China hogs. In the year's tests pigs of intermediate-type parentage gained most rapidly and made the most economical use of feed.

In preliminary studies on the use of colostrum and milk substitutes in the rearing of young pigs, it was found that mixtures of normal swine blood serum and dried cow's milk which were fed in place of colostrum failed to replace swine colostrum satisfactorily in the nutrition of young pigs. Furthermore, mixtures of dried cow's milk and cream used to replace sow's milk failed to

produce growth in young pigs to compare favorably with that of the control pigs receiving sow's milk.

Tests were made also on the effect of malnutrition on the blood-serum proteins of pigs. Results showed that in a group of pigs fed on corn silage, clover hay, and a mineral mixture, the blood proteins were markedly influenced by such underfeeding. The total serum protein of the pigs on this ration was 27 percent below that of control pigs fed a normal corn and protein supplement ration.

At the Iberia Livestock Experiment Station, Jeanerette, La., seven feed and pasture combinations were compared for the fattening of fall-farrowed pigs. Of these, a ration of corn, 2 parts; rice polish, 1 part; and a suitable allowance of a protein concentrate consisting of shrimp meal 2 parts and cottonseed meal 1 part, fed to pigs on red-clover pasture produced the greatest average daily gain and the most efficient utilization of feed, closely followed by the use of the same ration with oats pasture.

At the Coastal Plains Experiment Station, McNeill, Miss., the value of McNeill or cluster clover (*Trifolium glomeratum*) as a pasture for fattening pigs, in comparison with the semi-improved open-woods pasture of carpet grass and native woods grasses commonly used in this section, was shown. Of two lots of pigs otherwise fed alike, those on the McNeill clover made average daily gains exactly double those of the pigs on the native pasture.

RECORD-OF-PERFORMANCE STUDIES

A summary of the data from 30 litters of pigs used in record-of-performance studies at the Beltsville station showed in some litters a wide variation in the average daily gains and feed-utilization ability between the group of four pigs selected as the representative test group and the remainder of the litter. There was, for example, a difference in average daily gain as high as 0.6 pound between the two groups in some litters. Differences in feed consumption per 100 pounds of gain between the two groups varied from 0.8 pound to 102.7 pounds, when the animals were fed from an age of 72 days to final weights of about 225 pounds. The results indicated further that with many instances of wide variation in the performance of the two groups, testing of the entire litter would seem to be necessary for accurate results.

HORSE AND MULE INVESTIGATIONS

Breeding experiments at Beltsville to determine the merits of the Thoroughbred-Morgan cross as saddle-type stock and the value of the Morgan dam for outcrosses with the Thoroughbred, produced a superior utility and pleasure-type saddle horse. Results thus far indicate that the offspring have the following improved qualities over Morgan breeding: Greater length and flexibility of neck, more sloping shoulders, higher and sharper withers, greater size and ranginess, and greater length of stride. Improvements obtained over the Thoroughbred were: Better feet and substance of bone, better temperament and greater docility, and more action at the walk and trot.

Crosses have also been made with the Thoroughbred sire on Percheron mares to determine the value of this cross for producing an active draft animal of medium size adaptable to general farm use in this area. Results indicate that alertness and quality are transmitted satisfactorily to the progeny by the Thoroughbred blood and substance and sturdiness by the Percheron blood.

Breeding, feeding, and management studies were continued during the year at Middlebury, Vt., with a curtailed stud of 40 breeding animals. The demand for seed stock from this station continues to exceed the supply of surplus animals. During the year breeding stock was furnished the Florida Agricultural Experiment Station and private breeders in Ohio, Michigan, and New York. Studies with light horses showed that the average growth of these animals during the period of their development for 1 year after weaning were: Height, 7.64 inches; weight, 325 pounds; heart girth, 11.7 inches; loin girth, 11.8 inches; front cannon, 1.93 inches; hind cannon, 2 inches. The average weight of the weanlings was 451.5 pounds, an average increase of 2 pounds over the weight of the preceding year.

Investigations in western horse-husbandry problems were continued at Miles City, Mont., with a stud of approximately 250 animals, including purebred Belgian, grade draft, purebred Morgan, and grade light horses.

During the winter feeding period, light-type weanling colts on a ration of whole oats and alfalfa hay made average daily gains of 1.67 pounds per head, compared with average daily gains of 0.89 pound by those on alfalfa hay alone. Feed consumed per 100 pounds of gain was 307.18 pounds of oats and 689.31 pounds of alfalfa hay by the former group, and 1,830 pounds of alfalfa hay by the latter group. Draft-type weanlings wintered on oats and alfalfa hay made average daily gains of 1.7 pounds. Feed consumption was 449.8 pounds of oats and 854.8 pounds of alfalfa hay per 100 pounds of gain.

CERTIFICATION OF ANIMALS IMPORTED FOR BREEDING

Under the provisions of paragraph 1606 of the Tariff Act of 1930, certificates of pure breeding were issued for 149 horses, 5,399 cattle, 1,042 sheep, 6 swine, 805 dogs, and 10 cats. The total number of animals certified during the year was 7,411.

POULTRY INVESTIGATIONS

POULTRY BREEDING

In egg-quality studies, neither antecedent production nor egg weight was significantly correlated with the percentage of thick albumen in both the White Leghorn and Rhode Island Red eggs used. Breed differences in egg weight and percentage of thick albumen were found, but there was a greater variation in percentage of thick albumen among individual hens of the same breed than between breeds or from any other cause. This indicates the possibility of improving egg quality through the selection of breeding stock for high percentage of thick albumen.

In a study to determine the major factors associated with annual egg production, it was found that the following were responsible for approximately 80 percent of egg production: Time of sexual maturity, percentage of production before March 1, persistence of production, and broodiness. It was demonstrated that the best measure of rate of production is the percentage of production before March 1, and of persistence of production, the number of eggs laid during the months of August and September of the year following date of hatch.

In a study of egg weight, it was shown that a close approximation of the mean annual egg weight can be determined at the beginning of the pullet laying year from the average weight of the first 10 eggs laid, the body weight, and the age when the first egg is laid. A very reliable estimate of the mean annual egg weight can be ascertained by computing the mean weight of the eggs laid by each bird on any specified day of the week throughout the first laying year.

A study of the inheritance of sexual maturity involving approximately 2,100 White Leghorns and 1,800 Rhode Island Reds showed that full sisters matured sexually more nearly at the same age than did either half sisters or less closely related pullets, and that half sisters matured more nearly at the same age than less related pullets.

PHYSIOLOGY AND HATCHABILITY STUDIES

In a study of eggs it was found that the characteristic protein in the thick white of an egg is ovomucin. The thick white is deposited around the yolk before the formation of the shell membrane. The thin white is subsequently formed with the addition of water and ovoglobulins through the shell membrane.

Among eggs laid on successive days, the stage of development reached by the embryo at the time a fertile egg is laid is positively correlated with the length of time which has elapsed since an egg was laid on the previous day. The stage of development of the embryo at the time of laying is generally supposed to affect the probability that an egg will develop normally on subsequent incubation.

Inadequate diet of the breeding flock and genetic and incubational factors may each or severally be responsible for death of embryos from the malposition, head under left wing.

POULTRY FEEDING

A study of the vitamin D requirements of laying chickens showed that the optimum level of cod-liver oil in the diet is between 1 and 2 percent. When 4 percent or more was fed there was a distinct decrease in egg production,

as well as in the percentage of hatchability of the fertile eggs set. When an oil solution of irradiated ergosterol was used as a source of vitamin D, 10 to 20 times as much of this vitamin (as measured by assays with rats) was required as when cod-liver oil was used.

In a continuation of the study of the effect of meat meals on egg production and hatchability, it was found that the materials composing them are of considerable importance. Meat meals containing a small percentage of dried liver gave uniformly good hatchability. A water-chloroform extract of rice bran had some value in preventing the development of nutritional perosis.

Three simple diets containing, in addition to cod-liver oil and minerals, only (1) corn and corn gluten meal, (2) wheat middlings, and (3) soybean meal and dextrin, were fed to chicks from the time they were 1 day old until they had nearly completed their first year of egg production. Chemical analyses failed to demonstrate any significant differences in the composition of the egg proteins.

A preliminary study of the effect of the level of protein in the diet of growing chicks showed that between 15 and 25 percent had little or no effect on the mature live weight. Mature live weight was decreased on levels below 15 percent. The chief effect of the higher levels of protein intake was to stimulate growth during the first 8 to 12 weeks of life.

Feeding experiments with turkeys carried on for 5 years indicate that when birds have access to growing green feed, it is unnecessary to add a mineral supplement to rations containing enough 50-percent-protein meat scrap, or enough of a combination of meat scrap, fish meal, and milk to cause normal growth rate. The experiments showed also that the inclusion of an abundant supply of green feed or other supplements containing vitamin G is necessary in a successful ration for growing poults, and that turkeys require more protein than chicks, at least during the first 8 weeks.

BIOCHEMIC DIVISION

The work of the Biochemic Division, under M. Dorset, chief, consisted mostly of investigations on hog cholera, biological products used in diagnosing disease, dips and disinfectants, and research on problems concerning meats and meat food products.

HOG-CHOLERA INVESTIGATIONS

There were produced during the year, for experimental work, 40,796 cubic centimeters of hog-cholera virus. No serum was produced, since the surplus from the preceding year was sufficient to meet experimental needs, including a supply of serum to various farms of the Bureau where a project involving the immunization of suckling pigs is being carried out.

IMMUNIZING VALUE OF DEFIBRINATED-BLOOD VIRUS AND CLEAR VIRUS

The report for the preceding year gave results of a comparison of clear virus and defibrinated-blood virus in their immunizing properties when used simultaneously with anti-hog-cholera serum. These experiments were continued on two farms. On these farms 81 pigs were immunized with serum and clear virus and 89 with serum and defibrinated virus. The pigs remained well after simultaneous inoculation. Five months later 10 pigs from each of the two lots were tested for immunity. All the tested pigs remained well, thus indicating that an equally firm immunity was established by the use of clear virus and of defibrinated-blood virus. In these experiments, together with those of the preceding year, 197 pigs were given a simultaneous inoculation of serum and clear virus. Of these, 40 pigs, selected at random, were tested for immunity by virus injection 5 or 6 months later and all were immune. These experiments indicate that clear virus can be used effectively to produce immunity by the serum-simultaneous method.

SERUM-ALONE TREATMENT FOLLOWED BY VIRUS AFTER AN INTERVAL OF 9 DAYS

Under present regulations, feeder pigs are required to be immunized against hog cholera before being shipped to farms. The method used almost entirely is the simultaneous inoculation of serum and virus. At times, owing to unfavorable conditions during shipment, losses have occurred among these inoculated pigs after they reach the farm. An effort is being made to determine

whether pigs can be effectively immunized by administering serum in stockyards, and then injecting the virus after the pigs reach the farm. Such a system would prevent the pigs being shipped during the period of reaction resulting from the administration of virus.

As a beginning of the study, two farm herds containing a total of 90 pigs were divided. Forty-two pigs were given the regular serum-simultaneous inoculation, and 48 received serum alone. Nine days later the 48 pigs were each given 2 cubic centimeters of active hog-cholera virus. All the pigs in this experiment remained well after the treatment. Five months later an immunity test was made by injecting five pigs from each group with virus of known virulence. All the tested pigs remained well. These results are in conformity with those reported for the fiscal year 1928, when a similar experiment, in which the virus was injected 7 days after the serum, was carried out on three farms. More than 100 pigs have now been successfully immunized by the new process.

PRESERVATIVES FOR VIRUS AND SERUM

In a study made to develop a better preservative for virus, 7 lots of defibrinated virus blood from pigs sick with hog cholera were preserved with glycerin. To 6 of these there was added 40-percent glycerin, and to 1 of these, 30-percent glycerin. The mixtures of glycerin and virus blood were held at ice-box temperature, 8° to 10° C., and tested after varying intervals. The one lot preserved with 30-percent glycerin retained its virulence when last tested, after 232 days. Of the lots preserved with 40-percent glycerin, 1 was still virulent after 150 days but nonvirulent after 248 days. The second lot had lost its virulence after 215 days. The third lot was still virulent after the same length of time. The other 3 lots preserved with 40-percent glycerin were virulent when tested at 84, 151, and 171 days, respectively. In general, indications are that virus preserved with 40-percent glycerin retains its virulence for more than 100 days and at times very much longer. The virus preserved with glycerin is of clear red color and in excellent physical condition. The feasibility of the use of glycerin as a preservative for virus, in practice, warrants further study, particularly since laboratory experiments showed that 30-percent glycerin by volume prevented the growth of contaminating organisms in blood or serum from pigs sick with cholera when the preserved blood or serum was kept at refrigerator temperatures.

Experiments to determine the value of phenylmercuric acetate as a preservative for serum were still in progress at the end of the year. It has been observed that phenylmercuric acetate will produce sterility in rather heavily contaminated clear serum when used in a concentration of 1 part of the preservative to 2,000 parts of serum, and stored in the refrigerator. In whole defibrinated blood phenylmercuric acetate, in a concentration of 1 to 2,000, is not an effective preservative, but a 1-to-10,000 concentration with 0.5 percent of phenol sterilized contaminated whole blood after 6 weeks' storage. The sterilizing effect is influenced principally by the number of contaminating organisms present. In the previously mentioned work the number was 1,500,000 per cubic centimeter. When the contaminating organisms did not exceed 150,000 per cubic centimeter, a phenylmercuric acetate concentration of 1 to 4,000 sterilized the product in 1 week, and a concentration of 1 to 20,000, with 0.25 percent of phenol, rendered the serum practically sterile in 2 weeks.

COMPLEMENT FIXATION AND PRECIPITATION

Studies of complement fixation and precipitation were carried out by using a large number of different antigens prepared from tissues and fluids obtained from cases of experimental hog cholera. A number of antibodies were also studied, including not only the whole antiserum but various chemically separated fractions. In general, no satisfactory complement fixation or precipitin reaction was obtained by any of the methods tried. However, one important observation was made, namely, that the complement content of the serum of every pig studied became greater with the onset of hog cholera.

VACCINES FOR HOG CHOLERA

To reduce the cost of immunizing hogs, much study has been devoted during the last year to various methods of producing attenuated virus which might serve as a vaccine. If such a vaccine could be developed, the use of serum

would be unnecessary, and the process of protecting hogs against cholera would be simplified and cheapened. A number of different methods of attenuation were tried and a large number of pigs used. Distinct progress was made. Vaccines have been produced which afforded complete protection and although this has been done before, it was possible to approach more nearly the goal, which is a reliable vaccine, free from harmful properties. This work, which is of major importance, is being continued.

TUBERCULIN AND MALLEIN

The preparation and distribution of tuberculin and mallein for official use by Bureau and State officials were continued. The year's output of tuberculin was as follows: Subcutaneous tuberculin, 80,630 cubic centimeters; intradermic tuberculin, 1,859,380 cubic centimeters; ophthalmic tuberculin, 1,900 disks; avian intradermic tuberculin, 11,475 cubic centimeters. More than 80 percent of the intradermic tuberculin produced was prepared from cultures grown on the synthetic medium which has been discussed in previous reports. Both field and laboratory results with this new form of tuberculin have been so gratifying that the production of the old Koch tuberculin was discontinued in April 1934, so that the new form of tuberculin is now being used for all official tests.

The number of cattle tested increased materially during the last 6 months of the fiscal year. Notwithstanding the larger quantity of tuberculin required as a result of the increased testing the work has been carried out without additions to the laboratory force. This has been made possible by the development of new devices and improvements in technic, such as the use of high-speed centrifuges to replace the ordinarily slow paper filtration.

STAINED ANTIGEN FOR PULLORUM-DISEASE DIAGNOSIS

Stained antigen for experimental use, sufficient to make 405,500 tests, was shipped to various State officials. Four additional firms were licensed to manufacture the stained antigen, making a total of 28 firms now preparing this product. Twenty-eight samples of commercially produced antigen were examined.

The use of the rapid, whole-blood, stained-antigen test continues to increase. Favorable reports have been received from several States, where large-scale testing has been carried out this year, giving evidence of the value of the test in controlling losses from pullorum disease. Field experiments indicate that one annual test of the laying flock just prior to the hatching season, with removal of the reactors, is effective in eliminating losses of baby chicks from pullorum disease.

Laboratory studies of various strains of *Salmonella pullorum* and of methods of producing the antigen have been continued but have not yet progressed to a point where any change in present methods of production are warranted.

INVESTIGATIONS OF DIPS, DISINFECTANTS, AND ANTHELMINTICS

Routine analyses were made of 214 samples of dips, disinfectants, serums, and analogous products. There were prepared and forwarded to inspectors in the field the following: 487 new outfits for testing arsenical dipping baths and supplies to make 500,720 field tests; 8 new outfits for testing lime-sulphur dipping baths and supplies to make 6,000 field tests; supplies to make 270 tests of nicotine dipping baths; and supplies to make 5,300 tests for phenol in viruses, serums, and analogous products. The total number of tests provided for was 512,290, an increase of 36 percent over that of the preceding year, nearly all the increase being caused by demand for supplies for the arsenical test.

Investigation of the influence of varied acidity and alkalinity upon the stability of hypochlorite solutions was extended to hypobromite and hypoiodite in order to obtain adequate data on the mechanism involved. The data obtained are of fundamental scientific importance. In the course of the work on the stability of the hypohalites, improved methods were developed for the preparation and chemical determination of bromite.

A process was worked out for the use of high-grade calcium hypochlorite in the disinfection of tannery effluents against anthrax in cases where the direct use of chlorine is not practicable. Experiments indicated that full activity of the "available chlorine" of the substance could be brought out through previous acidification of the effluent by addition of sufficient hydrochloric acid.

During the year improvements were made in the methods for the analysis of concentrated proprietary arsenical cattle dips. It is believed that an improvement has been made in the method for separating unsaponified matter from soap, which is also a step in the determination of unsaponifiable matter in fats and oils.

Considerable study was given to the preservative and bactericidal properties of glycerin. It was found that 30-percent glycerin by volume was an effective preservative for defibrinated blood or serum when kept in the refrigerator (8° to 10° C.) or at room temperature (25° to 30°). At incubator temperature (37° to 38°) 35-percent glycerin was required. Glycerin was effective in destroying the avian tubercle bacillus when used in mixture with defibrinated blood at a concentration of 50 percent by volume, provided the mixture was kept at incubator temperature for 2 weeks. At refrigerator temperature avian tubercle bacilli mixed with defibrinated blood were not destroyed by 50-percent glycerin, even after 60 days of exposure.

A study was made of benzyl-phenol and some of its chlorinated derivatives. These products show the same selective action for different species and varieties of bacteria as has been observed in the case of the other disinfectants. These compounds, like other similar compounds, are greatly reduced in germicidal efficiency in the presence of organic matter but, in general, their potency seems to hold up as well as that of other higher phenols. Since they are practically odorless a further study is being given to these products.

In the study of the effect of disinfectants on fecal material from chickens, it was found that the presence of blood renders disinfection much more difficult. Results indicate that laboratory tests, such as are used in determining the phenol coefficient, are not reliable guides to the effectiveness of disinfectants under practical conditions. This matter is being given further study to determine the value of different substances and different concentrations under varying conditions which may be met with in practice.

The cooperative work with the Zoological Division on the relationship of chemical constitution to anthelmintic efficiency was continued. A practical advance consisted in the observation that methylchloroform appears to be an efficient anthelmintic for ascarids and hookworms of dogs.

MEATS AND MEAT FOOD PRODUCTS

A survey was made of various chemical methods for the detection of incipient putrefaction in meats, and a special study was conducted on the quantitative determination of hydrogen sulphide during spoilage. The investigations disclosed that there is no direct relation between the quantity of hydrogen sulphide and the extent of spoilage.

A study of denaturants for condemned fats has resulted in the development of a process involving the use of sulphur, which offers considerable promise. In addition, much study has been given to the quantitative determination of lactose in meats in the presence of other sugars. Promising results were obtained with fresh meat to which mixtures of different sugars had been added, but difficulty was encountered in similar determinations on smoked sausage.

EXPERIMENT STATION

The Bureau's Experiment Station at Bethesda, Md., under the supervision of W. E. Cotton, superintendent, continued its independent investigations and provided facilities for other divisions of the Bureau to conduct experimental studies. The station's investigations, for the most part, have concerned infectious abortion, tuberculosis, and vesicular stomatitis.

INFECTIOUS ABORTION

To gain more definite information as to the infectiousness of *Brucella abortus* of the swine type for cattle, an experiment was conducted similar to one reported last year. In this, 5 pregnant heifers, negative to the agglutination test, were placed in an enclosure about 30 yards square with 4 pregnant sows and a boar that had been artificially infected with a virulent *Br. abortus* strain of the swine type. Two pregnant sows, negative to the agglutination test, were added to the group as controls. The exposure continued until completion of the pregnancies of the cattle. In 5 weeks the 2 control sows reacted in a

titer of 1 to 200. During the course of the experiment all 5 heifers reacted to the agglutination test to some degree. One reacted in a titer of 1 to 200; one, 1 to 100; two, 1 to 50; and one, 1 to 25. These titers were maintained for only a short time and then became much reduced or disappeared. All 5 heifers gave birth to vigorous calves, and guinea-pig-inoculation results with uterine fluids and colostrum from each were negative. The results of the experiment were much like those previously obtained and indicated that cattle have much resistance to the type of infectious abortion micro-organism that commonly affects swine.

An effort was made to gain more light on the routes by which bulls may become infected by subjecting four 2-year-old animals of this sex to the following types of exposure: One bull was given, by mouth, 10 liters of water to which the growth of *Br. abortus* from 8 potato-agar slants had been added. A second bull received a similar quantity in the same manner and, in addition, conjunctival exposure. The remaining two bulls were exposed through the scarified skin. The suspensions used in making the exposures were prepared from the second and fourth transfers of a strain of *Br. abortus* isolated from the milk of a naturally infected cow. All four bulls acquired agglutination titers of from 1 to 200 to 1 to 500. Three of the animals gave but slight reactions 4 months later, but the one exposed via the mouth and conjunctiva continued to react in a titer of 1 to 200 after a year, indicating, as was later definitely proved, that the infection became established in this animal.

Efforts were made to acquire further information as to the location of *Br. abortus* in the bodies of naturally infected cattle. This was done by preparing emulsions of many organs or tissues from the carcasses of animals reacting to the agglutination test and injecting guinea pigs with them. Three heifers were used, two of which had failed to conceive after repeated services. One heifer reacted to the agglutination test in a titer of 1 to 100. Guinea pigs injected with emulsions of the lungs, iliac lymph glands, supramammary lymph glands, and udder tissue of this animal acquired the disease. The second heifer reacted in a titer of 1 to 200. Guinea pigs injected with emulsions of the spleen and mammary gland of this animal acquired the infection. The third heifer reacted in a titer of 1 to 500. Of the 25 organs or tissues from which emulsions were prepared and with which guinea pigs were injected, results indicated the presence of the infection in the postpharyngeal, precrural, iliac, and supramammary lymph glands and udder.

Attempts were made to isolate *Br. abortus* from the blood of high-reacting cattle. Although these efforts were unsuccessful in 19 cows, *Br. abortus* was isolated from the blood of 2 that had been infected through intravenous injection; in 1 on the fifty-second day after the injection; and in the other on the fourteenth, twenty-eighth, and fifty-sixth days.

An opportunity was presented for observing infectious abortion in a large herd of swine, as well as conducting post-mortem examinations from time to time when the animals were slaughtered. To obtain information as to the localization of infection in this species, organs or tissues of many high reactors were obtained at time of slaughter and used in preparing emulsions with which guinea pigs were injected. The presence of the infection was indicated in the gastro-hepatic and cervical lymph glands, kidney, uterus, testicle, seminal vesicles, spermatic cord, spleen, lungs, pubis, and a skin abscess.

The agglutination test was applied to blood samples from a considerable number of United States Government-owned herds in efforts to eradicate the disease from them, and reasonably encouraging results were obtained.

Vaccination as a means of combating the disease continued to receive consideration. Two vaccine experiments were completed. One revealed that it is possible for a *Br. abortus* strain that has become avirulent for guinea pigs by long continued propagation on artificial culture medium to lose its immunizing power for cattle although still retaining much of its ability to induce agglutinins. A *Br. abortus* strain of low virulence which was employed in the same experiment, however, gave indication of being reasonably free from the objectionable features of virulent strains for vaccine preparation and at the same time appeared to confer a serviceable degree of immunity when used to vaccinate unbred heifers. The second vaccine experiment dealt with calfhood vaccination. It yielded results in accord with those from a previous calfhood vaccination experiment, thus affording further proof that the vac-

cination of calves from 4 to 6 months of age induces in them an immunity to infectious abortion that, in a high percentage of cases, protects against *Br. abortus* conjunctival exposure during first pregnancy and gives indication of being lasting.

Although the data obtained from other vaccine experiments do not yet justify conclusions, one feature is of noteworthy interest. In a test, involving exposure by two methods, conjunctival and natural, calves and yearlings were injected on the same date and with the same lot of vaccine. In 6 months the agglutination reactions of the calves caused by the vaccine injections had either disappeared or had subsided to very low titers, whereas the reactions induced in the yearlings persisted at fairly high titers for several months longer.

The cooperative abortion disease projects, begun in 1929, with eight State universities and experiment stations were continued.

TUBERCULOSIS

Studies of so-called "skin-lesion tuberculosis" were continued. Four cattle were injected subcutaneously with the two apparently identical strains of acid-fast micro-organisms which had previously been reported as having been obtained from this type of lesion. All four cattle developed swellings at sites of injection in from 2 to 3 weeks. In two animals, the swellings gradually subsided, but in the other two they became very pronounced and were still visible when all four cattle were killed 8 months after inoculation. None of the cattle showed a sensitization to mammalian tuberculin when tested at the end of the second, third, and seventh months, but all of them reacted positively to avian tuberculin at the end of the third month and one at the end of the seventh month. From one of these cattle, killed at the eighth month, an artificial skin lesion was removed from which an acid-fast bacterium was recovered in pure culture apparently identical to the organism injected.

Numerous field specimens of glands or other organs were examined for the presence of acid-fast organisms. From a lymph gland of a sheep an organism was recovered which culturally had the rough, sparse growth of a bovine tubercle bacillus but which on animal inoculation was proved to be avian in type. Twenty-four samples of cheese, purchased on the local market, were examined for the presence of virulent tubercle bacilli but all were found to be free. Thirty-eight samples of avian and mammalian tuberculin produced by commercial biological concerns in the United States were examined for purity and potency. Of these, eight were found to be unsatisfactory as to potency.

VESICULAR STOMATITIS

The types of virus of vesicular stomatitis known as the "Indiana" and "New Jersey" have been kept alive by passage through guinea pigs for approximately 8 years to help in identifying virus that might be obtained from additional outbreaks of this disease, and for study.

An experiment was completed in which equal quantities of each of the two types of virus were mixed in vitro and the mixture injected intracardially into four normal guinea pigs. One guinea pig developed vesicles on the metatarsal pads. Ten successive transfers were made from guinea pig to guinea pig with this virus. On each transfer, a group of guinea pigs immune to the Indiana virus and another group immune to the New Jersey type were also inoculated to determine whether both types of virus were still present. It was found that after the fourth transfer only the New Jersey type of virus survived. In a repetition of this experiment the Indiana type failed to survive the initial transfer.

Attention has been given to an unusual vesicular disease which appeared among garbage-fed hogs in southern California. The causal agent of the malady appears to be a filter-passing virus. The disease has been produced in hogs both by inoculation and by natural exposure, and lesions have also been produced on the tongues of horses by inoculation. The lesions in the horse are confined to the field of inoculation, and their formation is immediately preceded by an elevated temperature of very short duration. Efforts to infect cattle of any age, as well as sheep, goats, and guinea pigs, have failed.

FIELD INSPECTION DIVISION

Activities relating to control and eradication of scabies of sheep and cattle and various other animal diseases and the administration of regulations to prevent the introduction of livestock diseases of foreign origin were continued by the Field Inspection Division directed by George W. Pope. This division also administered regulations governing the inspection, humane treatment, and safe transport of export animals.

ERADICATION OF SCABIES

Sheep-scabies eradication went forward as in previous years in cooperation with authorities of various range States. Inspections in the field numbered 17,053,802 and 1,808,746 dippings were supervised. The total number of sheep in flocks in which infection was found was 78,418, about one-third as many as in the previous year. At the close of the year sheep scabies was not known to exist anywhere in the vast range areas lying west of Louisiana, Arkansas, Missouri, Iowa, and Minnesota. As a few herds in New Mexico were only recently freed of the disease, however, there is a possibility of slight infection remaining. In Iowa the Bureau is cooperating with State authorities in an eradication campaign inaugurated the latter part of the year. In some other Midwestern States where no cooperative work is in progress the disease continued to be widely scattered among farm sheep.

In cooperative cattle-scabies eradication, satisfactory progress was made for the most part in 3 of the 4 States in which the greater part of the remaining infection exists. Inspectors in the field made 3,002,255 inspections and supervised 633,629 dippings. Cattle in infected herds totaled 181,695 head. In New Mexico, Colorado, and Wyoming intensive fall dipping campaigns yielded excellent results. The spring campaigns in these districts were less successful, especially in New Mexico, because of severe drought.

Eradication of sarcoptic scabies was completed in Montana, and intensive campaigns in two districts of Colorado apparently eliminated the infection in that State. This variety of scabies also exists to some extent in Nebraska, Iowa, and possibly other Midwestern States.

Efforts to complete the eradication of scabies among goats in Texas were made by State and Bureau forces. Only 3 herds containing 1,313 animals were found to be infected and all of these were properly dipped. Inspections and supervised dippings totaled respectively 231,034 and 5,076 head.

Inspections of horses on the Blackfeet Indian Reservation in Montana failed to disclose any cases of scabies, indicating the probable eradication of the disease in that area.

ERADICATION OF DOURINE

No cases of dourine were found. Horses for slaughter were shipped in considerable numbers from the previously infected area comprising parts of Oregon, Idaho, and Nevada. Blood samples were taken from many of these horses at time of slaughter and tests were made, with no positive reactions. This is the only section of the United States in which there is reason to believe that dourine may exist. If still present it is probably limited to a few of the wild or semiwild range animals. As a precautionary measure the area is being held under State quarantines. A report of the animals tested during the year appears on page 35.

CONTROL OF ANTHRAX

No serious outbreaks of anthrax occurred. In areas where the disease has prevailed in recent years, Bureau forces cooperated with State authorities in encouraging owners to administer preventive treatment to their cattle. Bureau employees also cooperated with officials of the Indian Service on various reservations in South Dakota in administering preventive treatment to cattle owned by Indians.

INSPECTION OF HORSES FOR INTERSTATE SHIPMENT

In the course of their regular duties Bureau veterinarians inspected 1,130 horses and 24 mules for interstate shipment. Horses to the number of 182 were subjected to a mallein test without positive reactions. Present evidence indicates that glanders has become practically nonexistent in the United States.

INSPECTION AND QUARANTINE OF IMPORTED ANIMALS

All horses, ruminants, and swine from foreign countries were inspected when presented for importation at coast and border ports of entry. Importations of domestic ruminants and swine were practically limited to those from the Channel Islands, Canada, Mexico, and the Virgin Islands. The number and kind of animals imported are shown in table 1.

TABLE 1.—*Animals imported,¹ fiscal year 1934*

INSPECTED BUT NOT QUARANTINED

Port of entry	Cattle	Swine	Sheep	Goats	Horses and mules	Asses	Other animals
Baltimore.....					3		11
Boston.....					50		5
Galveston.....							1
Key West.....					23		
New Orleans.....					2		
New York.....					267	9	1
San Francisco.....					3		
San Juan, P. R.....	2, 173	56		3	88	1	3
Tampa.....					1		
Canadian border ports.....	7, 014	101	2, 757	9	7, 911		4
Mexican border ports.....	² 69, 729	4	1, 319	13	10, 994	182	11
Total.....	78, 916	161	4, 076	25	³ 19, 342	192	36

INSPECTED AND QUARANTINED

Port of entry	Cattle	Swine	Sheep	Goats	Horses and mules	Asses	Other animals
Baltimore.....		29					
Boston.....							10
Los Angeles.....				2	5		2
New Orleans.....							32
New York.....	118			1		1	1
San Francisco.....			16		14		
Canadian border ports.....	18	5					
Mexican border ports.....							
Total.....	136	34	16	3	19	1	45

¹ 10 horses and 3,849 cattle were refused importation owing to infestation with or exposure to cattle ticks.

² In addition to those shown in the table, 5,670 Mexican cattle passing through the United States under bond were inspected at the time of entry.

³ Of this number 640 were mules.

Three hundred and thirteen domestic fowls and 54 pigeons were inspected at ports of entry. These originated in Great Britain, Germany, the Netherlands, and New Zealand. In cooperation with the Bureau of Biological Survey, inspectors of the Bureau of Animal Industry at Mexican border ports inspected and supervised the quarantine of 13,611 quail from Mexico.

With the cooperation of customs officers and surgeons in the quarantine service of the Bureau of the Public Health Service at ports of entry, 14 vessels carrying sea-stores livestock from countries infected with foot-and-mouth disease were held. The 67 animals on these ships were slaughtered and the spaces occupied by them on the vessels disinfected. Public Health quarantine officers obtained for the Bureau 10,794 declarations of shipmasters as to the presence or absence on their vessels of prohibited livestock and meats. Vessels to the number of 2,950 were found to be carrying prohibited meats.

RESTRICTIONS ON IMPORTATION OF ANIMAL BYPRODUCTS, FEEDING MATERIALS, ETC.

A revision was made in regulations designed to guard against the introduction, into the United States, of anthrax, foot-and-mouth disease, and rinderpest through the medium of various imported animal byproducts and feeding materials. Although the new regulations eliminated certain materials previously

restricted, a careful supervision was continued over animal byproducts, hay, and straw. Tanneries and other establishments receiving restricted consignments were required to provide facilities for segregated storage and take measures to prevent the possible contamination of streams and lands with anthrax-infected effluents. Cars numbering 2,817 used for transporting materials of this kind to tanneries or other manufacturing plants in the United States were disinfected after such use.

The destruction of hay and straw packing was required after arrival in the United States unless the country of origin was free from foot-and-mouth disease and rinderpest or the hay or straw was shown by an acceptable certificate to have been properly disinfected before use. The Bureau continued control over the importation of animal manure.

Importers of calf stomachs for the manufacture of rennets, and animal glands for the manufacture of biological products, were required to handle consignments under restrictions, provided there was foot-and-mouth disease or rinderpest in the country from which shipment was made.

Special attention was given to the enforcement of a prohibition on the landing of fresh or frozen meats, or garbage derived therefrom, in instances of vessels which had been provisioned in regions where foot-and-mouth disease exists.

INSPECTION AND SAFE TRANSPORT OF EXPORT ANIMALS

Animals totaling 10,443 head were inspected prior to their exportation. Those shipped by water were afforded the protection specified in regulations of the Department governing space, fittings, and equipment for humane treatment and safe transport. The number and kinds of animals inspected for export are shown in table 2.

TABLE 2.—*Inspection and testing of animals¹ for export, fiscal year 1934*

Kind of animal	To Canada	To other countries	Total	Kind of animal	To Canada	To other countries	Total
Cattle.....	561	² 2,341	2,902	Mules.....		3,292	3,292
Swine.....	127	2,272	2,399	Asses.....		7	7
Sheep.....	116	³ 337	453	Other animals.....		1	1
Goats.....	13	62	75				
Horses.....	266	1,048	1,314	Total.....	1,083	9,360	10,443

¹ 1,218 chicks were inspected for shipment to Mexico, Central America, and South America.

² Includes 10 cattle from Canada.

³ Includes 1 sheep from Canada.

MEAT INSPECTION DIVISION

The work of the Federal meat-inspection service under the direction of R. P. Steddom, chief, conducted in the usual extensive manner, shows a total of 77,568,767 animals slaughtered under inspection, an increase of about 3 percent over that of the preceding year. In addition, special inspection, reported separately, was conducted for Civilian Conservation Camps, the Federal Surplus Relief Corporation, and other governmental agencies.

GENERAL MEAT INSPECTION

Inspection was conducted at 741 establishments located in 255 cities and towns, as compared with 770 establishments in 262 cities and towns during the fiscal year 1933. Inspection was inaugurated at 15 establishments and withdrawn from 35, as compared with 25 and 28, respectively, during the preceding year. Inspection was withdrawn from the establishments on account of discontinuance of slaughtering or interstate business. On June 30, 1934, there were 722 establishments in 250 cities and towns operating under inspection.

ANTE-MORTEM AND POST-MORTEM INSPECTION

The results of the ante-mortem and post-mortem inspections are given in tables 3 to 6, inclusive. Tables 4, 5, and 6 show the diseases and number of condemnations on ante-mortem and post-mortem inspections.

TABLE 3.—*Ante-mortem and post-mortem inspection of animals, fiscal year 1934*

Kind	Ante-mortem inspection				Post-mortem inspection		
	Passed	Sus- pected ¹	Con- demned ²	Total	Passed	Con- demned	Total
Cattle.....	9, 412, 559	241, 080	4, 742	9, 658, 381	9, 571, 346	81, 606	9, 652, 952
Calves.....	5, 656, 022	6, 726	3, 547	5, 666, 295	5, 655, 251	17, 851	5, 673, 102
Sheep and lambs.....	16, 423, 552	3, 067	6, 621	16, 433, 240	16, 407, 031	22, 333	16, 429, 364
Goats.....	7, 289	12	14	7, 315	7, 272	30	7, 302
Swine.....	45, 667, 785	105, 132	22, 262	45, 795, 179	45, 619, 905	153, 291	45, 773, 196
Horses.....	32, 822	28	105	32, 955	32, 522	329	32, 851
Total.....	77, 200, 029	356, 045	37, 291	77, 593, 365	77, 293, 327	275, 440	77, 568, 767

¹ "Suspected" is used to designate animals suspected of being affected with disease or condition that may cause condemnation in whole or in part on special post-mortem inspection.

² For additional condemnations see tables 4 to 6, inclusive.

TABLE 4.—*Number of animals condemned for various diseases and conditions on ante-mortem inspection, fiscal year 1934*

Cause of condemnation	Cattle	Calves	Sheep and lambs	Goats	Swine	Horses
Abortion.....			1			
Actinomycosis.....	1					
Arthritis and other bone diseases.....	3	1			554	
Blackleg.....		2				
Dropsical diseases.....					3	
Emaciation.....	167	53	10		123	
Epithelioma.....	11					
Fistula.....						1
Hog cholera.....					2, 763	
Immaturity.....		120			1	
Injuries.....	7	1	1		24	3
Mange.....					4	
Mastitis.....	3					
Melanosis.....						2
Metritis.....	3					
Milk fever.....	1					
Moribund.....	4, 178	3, 360	6, 537	14	16, 543	97
Omphalophlebitis.....		1				
Parasitic diseases.....			1			
Paresis.....	4					
Pneumonia, enteritis, peritonitis, etc.....	17	5	64		189	2
Pregnancy and recent parturition.....	1				1	
Pyrexia.....	15	1	6		956	
Rabies.....	1	1			1	
Railroad sickness.....	2					
Septicemia and pyemia.....	2	1			612	
Tetanus.....	2	1			1	
Toxemia.....					6	
Traumatic pericarditis.....	2					
Tumors, carcinomata, sarcomata, ab- scesses, etc.....	321		1		451	
Tympanitis.....	1					
Total.....	4, 742	3, 547	6, 621	14	22, 262	105

TABLE 5.—*Number of animals condemned for various diseases and conditions on post-mortem inspection, fiscal year 1934*

Cause of condemnation	Cattle	Calves	Sheep and lambs	Goats	Swine	Horses
Actinomycosis.....	929	41			1	
Anaplasmosis.....	86					
Anthrax.....	1				235	
Arthritis and other bone diseases.....	211	367	566		8,341	
Asphyxia.....	2	2	17		698	
Blackleg.....	5	8				
Caseous lymphadenitis.....			1,850	5		
Cellulitis.....	2				9	
Contamination.....		3	1		1,776	
Cysticercosis.....	149	16	398		35	
Dropsical diseases.....	55	3	28		60	1
Emaciation.....	18,414	4,742	4,560	3	783	71
Fistula.....						2
Frozen.....					1	
Gangrene.....	5				3	
Hog cholera.....					23,019	
Hydronephrosis.....	2		4		30	
Icterus.....	132	320	1,656	6	5,243	
Immaturity.....		5,497				
Influenza.....					9	
Injuries.....	3,744	591	1,020	1	2,564	6
Johne's disease.....	1					
Melanosis.....	50	94	72		127	83
Moribund.....	1		1		17	
Necrobacillosis.....	18		2		2	1
Omphalophlebitis.....		110				
Parasitic diseases.....	73		14		88	
Pneumonia, pleurisy, enteritis, peritonitis, etc.....	19,051	4,318	8,904	5	31,514	82
Pregnancy and recent parturition.....	83		10	9	22	1
Pseudoleukemia.....	997	33	6		302	1
Septicemia and pyemia.....	8,847	1,294	2,314		32,057	30
Sexual odor.....				1	5,472	
Skin diseases.....	3		1		117	
Splenic fever.....	3	1				
Strangles.....						35
Toxemia.....	4	5			14	
Tuberculosis.....	24,005	311	2		40,038	
Tumors, carcinomata, sarcomata, etc.....	4,527	88	42		548	16
Uremia.....	195	7	865		166	
Xanthosis.....	11					
Total.....	81,606	17,851	22,333	30	153,291	329

TABLE 6.—*Number of parts of carcasses,¹ of animals indicated, condemned for various diseases and conditions on post-mortem inspection, fiscal year 1934*

Cause of condemnation	Parts of carcasses of—					
	Cattle	Calves	Sheep and lambs	Goats	Swine	Horses
Actinomycosis.....	127,475	4,090			5	
Arthritis and other bone diseases.....	7	2	7		152	1
Caseous lymphadenitis.....				1		
Cellulitis.....	1				371	
Contamination.....	145	479	12		4,485	
Dropsical diseases.....		1				
Hydrocephalus.....		1				
Injuries.....	1,098	124			40,592	21
Melanosis.....	27	16			1	
Necrobacillosis.....			3			
Necrosis.....	67					3
Omphalophlebitis.....		2				
Tuberculosis.....	31,048	377			334,243	
Tumors and abscesses.....	10,370	5,904			552,020	227
Xanthosis.....	3					
Total.....	170,241	10,996	22	1	931,869	252

¹ In addition to the above parts, 795,225 cattle livers and 32,344 calf livers were condemned on post-mortem inspection.

INSPECTION OF MEAT AND PRODUCTS

The inspection and supervision of meats and products prepared and processed are shown in table 7, which is a record only of inspection performed and not a statement of the actual quantity prepared. The record of inspection is sometime duplicated when the product is reinspected during the different stages of preparation. Market inspection to facilitate interstate delivery of meats and products was conducted in 15 cities.

TABLE 7.—*Meat and meat food products prepared and processed under supervision, fiscal year 1934*¹

Product	Quantity	Product	Quantity
	<i>Inspection pounds</i> ²		<i>Inspection pounds</i> ²
Cured:		Compound and other substitutes for lard.....	323,493,535
Beef.....	129,084,823	Oleo stock and edible tallow.....	81,596,495
Pork.....	2,786,042,472	Oleo oil.....	59,194,334
All other.....	1,573,408	Oleo stearin.....	29,326,138
Sausage.....	760,424,249	Oleomargarine.....	87,332,908
Canned:		Miscellaneous.....	2,098,427,054
Beef.....	243,270,671	Horse meat:	
Pork.....	111,946,701	Cured.....	2,450,418
All other.....	6,284,380	Chopped.....	1,163,406
Product passed for cooking:		Canned.....	20,889,215
Beef.....	8,861,453	Horse meat and mutton canned.....	1,733,500
Pork.....	5,371,746	Horse meat and beef canned.....	341,056
All other.....	8,900	Horse oil.....	88,975
Pork to be eaten uncooked.....	83,980,430	Total.....	8,526,563,154
Meat extract.....	126,095		
Lard.....	1,682,522,964		
Lard oil.....	367,202		
Lard stearin.....	660,626		

¹ The following quantities of meat and meat food products were condemned on reinspection and destroyed for food purposes on account of having become sour, tainted, unclean, rancid, or otherwise unwholesome: Beef, 1,447,690 pounds; pork, 4,722,886 pounds; mutton, 32,787 pounds; veal, 34,176 pounds; horse meat, 4,190 pounds; total, 6,241,639 pounds.

² This term represents the total volume of inspection. The figures do not represent actual production as the same product may have been inspected and recorded more than once in the process of manufacture.

MEATS AND PRODUCTS CERTIFIED FOR EXPORT

During the fiscal year 52,996 official meat-inspection certificates were issued to cover the exportation of the following products: Beef and beef products, 84,586,453 pounds; mutton and lamb and their products, 2,281,828 pounds; pork and pork products, 718,779,694 pounds; horse meat and horse-meat products, 2,175,102 pounds; total, 807,823,077 pounds. There were also issued 5,269 certificates covering the exportation of 47,335,822 pounds of inedible animal products.

EXEMPTION FROM INSPECTION

The provisions of the meat inspection law requiring inspection usually do not apply to animals slaughtered by a farmer on the farm or to retail butchers and dealers supplying their customers. The retail butchers and dealers, however, in order to ship meat and meat food products in interstate or foreign commerce are required to obtain certificates of exemption. The number of such certificates outstanding at the close of the year was 1,027. During the year 60 certificates were canceled on account of the dealers retiring from business or ceasing to make interstate shipments, change of ownership, insani-tary conditions, failure to furnish required data, use of prohibited preservatives, and other causes.

During the year 62,445 shipments were made by retail butchers and dealers holding certificates of exemption. The shipments of the year covered products as shown in table 8.

TABLE 8.—*Shipments by retail butchers and dealers under certificates of exemption, fiscal year 1934*

Product	Car-casses	Quantity	Product	Car-casses	Quantity
	<i>Number</i>	<i>Pounds</i>		<i>Number</i>	<i>Pounds</i>
Cattle (3,522 quarters).....	880	402,989	Cured meats.....		866,010
Calves.....	10,196	1,349,504	Lard.....		71,039
Sheep and lambs.....	2,204	63,448	Sausage.....		242,415
Swine.....	98	12,648	Miscellaneous (headcheese, suet, compound, scrapple, etc.).....		50,850
Beef, fresh.....		3,479,826	Total.....	13,378	7,982,104
Veal, fresh.....		383,259			
Mutton and lamb, fresh.....		570,905			
Pork, fresh.....		489,211			

During the year 47,094 interstate shipments were made of meat and meat food products from animals slaughtered by farmers on the farms. The products composing these shipments are shown in table 9.

TABLE 9.—*Shipments of farm-slaughtered meat and products, fiscal year 1934*

Product	Car-casses	Quantity	Product	Car-casses	Quantity
	<i>Number</i>	<i>Pounds</i>		<i>Number</i>	<i>Pounds</i>
Cattle (2,515 quarters).....	629	237,623	Cured meats.....		417,555
Calves.....	42,105	3,140,534	Lard.....		6,819
Sheep and lambs.....	6,696	148,203	Sausage.....		144,416
Swine.....	3,166	91,058	Miscellaneous (scrapple, livers, headcheese, souse, etc.).....		42,342
Beef, fresh.....		32,625	Total.....	52,596	4,471,094
Veal, fresh.....		101,109			
Mutton and lamb, fresh.....		4,125			
Pork, fresh.....		104,685			

INSPECTION OF IMPORTED MEAT

Table 10 shows the inspection of imported meat and meat food products.

TABLE 10.—*Imported meat and meat food products inspected and passed, fiscal year 1934*

Country of origin	Fresh and refrigerated meat		Canned and cured meat	Other meat products	Total weight
	Beef	Other classes			
	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>
Argentina.....			16,592,645	5,600	16,598,245
Australia.....	8,942			13,102	22,044
Brazil.....			7,714,666		7,714,666
Canada.....	111,043	216,621	725,497	176,056	1,229,217
New Zealand.....	22,196	9,375		83,861	115,432
Paraguay.....			723,900		723,900
Uruguay.....			16,013,834	356,502	16,370,336
Other countries.....			1,071,895	251,250	1,323,145
Total.....	142,181	225,996	42,842,437	886,371	44,096,985

Table 11 shows the quantities of foreign meat and products excluded from the country because of unsoundness, presence of prohibitive preservatives, mislabeling, or other failure to comply with the regulations.

TABLE 11.—*Imported meat and meat food products condemned and refused entry, fiscal year 1934*

Product	Condemned	Refused entry
	<i>Pounds</i>	<i>Pounds</i>
Beef.....	8, 224	272
Mutton and lamb.....		6
Pork.....	517	3, 986
Total.....	8, 741	4, 264

IMPORTATION OF ANIMAL CASINGS

Animal casings from 52 foreign countries were admitted as follows: On certification, 15,985,942 pounds; on disinfection, 1,372,671 pounds; dried casings, 131,733 pounds; total, 17,490,346 pounds. Casings amounting to 1,117 pounds offered for importation were rejected and removed from the United States.

INSPECTION FOR OTHER BRANCHES OF THE GOVERNMENT

By request of other branches of the Government, reinspections of meat and meat food products were conducted, as shown in table 12, to determine whether the articles remained wholesome and conformed to certain specifications.

TABLE 12.—*Inspections for other branches of the Government, fiscal year 1934*¹

Branch of Government	Passed	Rejected
	<i>Pounds</i>	<i>Pounds</i>
Navy Department.....	33, 459, 592	1, 992, 556
Veterans' Administration (hospitals).....	4, 323, 848	117, 735
National Homes Service.....	3, 183, 226	97, 360
Department of Justice (Federal penitentiaries).....	2, 426, 464	155, 024
Marine Corps.....	2, 672, 026	70, 897
Coast Guard.....	979, 379	16, 373
War Department (Army Engineering Corps).....	648, 721	6, 588
Department of Interior (Bureau of Indian Affairs).....	555, 359	3, 193
National Zoological Park.....	84, 166	2, 425
Shipping Board.....	26, 595	984
Alaska Engineering Commission.....	20, 585	128
Total.....	48, 379, 961	2, 463, 263

¹ Not including inspections for special emergency agencies.

MEAT INSPECTION FOR SPECIAL AND EMERGENCY AGENCIES

The Bureau, in cooperation with various emergency agencies, supervised the slaughter and processing of cattle, calves, sheep, and swine.

INSPECTIONS FOR AGRICULTURAL ADJUSTMENT ADMINISTRATION HOG-REDUCTION CAMPAIGN

In the A. A. A. hog-reduction campaign the Bureau supervised the slaughter of 221,113 "piggy" sows and 1,080,535 pigs weighing from 71 to 100 pounds, of which 2,748 sows and 9,905 pigs were condemned on post-mortem. This operation resulted in 87,710,891 pounds of pork which was processed and shipped to various relief agencies. There were also slaughtered 5,067,419 pigs weighing from 25 to 71 pounds, which were destroyed for use as human food. These animals produced 21,414,007 pounds of inedible grease and 9,566,793 pounds of tankage.

NAVAJO SHEEP SLAUGHTERED UNDER SUPERVISION

At the request of the Bureau of Indian Affairs of the Department of the Interior, the Bureau of Animal Industry supervised the slaughtering of 85,390 Navajo sheep: 863 carcasses were condemned on post-mortem; 84,527 were refrigerated; 82,960 were shipped to various destinations, leaving 1,567 carcasses on hand for future disposal.

INSPECTIONS FOR DROUGHT-RELIEF CATTLE CAMPAIGN

Operations under the drought-relief cattle campaign covered the last 3 weeks of the fiscal year. Table 13 shows the number of cattle and calves handled and inspected during this period.

TABLE 13.—*Cattle and calves handled and inspected under drought-relief campaign*¹

Item	Cattle	Calves	Item	Cattle	Calves
Received.....	109,791	63,059	Passed post-mortem.....	98,465	59,744
Died en route.....	296	444	Condemned post-mortem.....	4,982	1,903
Died in pens.....	300	498	On hand at end of year.....	5,918	800
Condemned ante-mortem.....	126	114			

¹ The numbers of cattle and calves here reported are included in table 3.

Bureau inspectors likewise acted as custodians of the meat from drought cattle and calves and supervised the boning, canning, freezing, and shipping of the product to officially designated agencies. Operations supervised were of the following extent: Beef boned, 12,294,886 pounds; beef condemned on reinspection, 6,110 pounds; cans filled, 4,004,027; cans of meat condemned, 7,771; cans shipped, 800,640 (33,360 cases); calf carcasses, frozen, 42,960.

INSPECTIONS FOR FEDERAL SURPLUS RELIEF CORPORATION

Inspections also were made under various schedules of the Federal Surplus Relief Corporation. Post-mortem inspections of cattle resulted in 132,374 carcasses being passed and 1,766 condemned. A total of 28,430,290 pounds of meat were boned under supervision, of which 26,191 pounds were condemned on reinspection because of subsequent spoilage or deterioration. Supervision of canned beef from the foregoing cattle included the following items: Cans processed, 13,332,424; cans condemned, 71,613; cases of cans shipped, 511,396. Post-mortem inspections of swine resulted in 1,333,422 carcasses being passed and 4,040 condemned. A total of 170,042,142 pounds of processed pork were packed, of which 75,786 pounds were condemned on reinspection. The remainder was shipped. Lard packed and shipped under supervision totaled 18,490,630 pounds.

INSPECTIONS FOR CIVILIAN CONSERVATION CAMPS

At the request of the War Department the meat-inspections service made inspections from January to June 1934, for Civilian Conservation Camps. This work included the post-mortem examination of 15,061 food animals, principally swine, of which 32 were condemned, the remainder being passed. The processing of the resulting meat involved inspection of 433,342 pounds of meat and meat food products, including some reinspections during which 915 pounds of pork and beef were condemned.

MEAT-INSPECTION LABORATORIES

Analyses and examinations of meat and products were conducted in the meat-inspection laboratories in the several districts throughout the country. The number of products examined was 41,390, of which 2,159 products were not in accordance with the regulations. Included among these were meats and meat food products, edible fats and oils, cereals, spices, curing materials, colors, denaturing oils, water supplies, and miscellaneous articles. Of the products found at fault, 1,441 had been prepared in inspected establishments. The principal faults found were excessive added water in sausage, improper

application of artificial color to sausage casings, and failure to declare added substances permitted to be used under appropriate declaration. The products represented were removed from the establishments or utilized in the preparation of inedible products. Of the meat and meat food products offered for importation from foreign countries, 152 consignments were found at fault. Most of these were incorrectly labeled. The labels were corrected in most cases, in others the consignments were reexported. Out of 1,618 samples of water collected, 211 were found to be polluted. Corrective action followed in all cases.

LABELING MEAT AND MEAT FOOD PRODUCTS

During the year 18,409 labels and other markings for meat and meat food products were approved, whereas 1,477 failed of approval principally because of the inclusion of false statements or designs. Proposed labeling by domestic and foreign establishments that would convey false impressions of quality, food content, origin, disease-preventing or curative properties, or concealment of inferiority continued to require diligent supervision and research.

PACKERS AND STOCKYARDS DIVISION

The work of the Packers and Stockyards Division was directed during the year by A. W. Miller, chief. Under the Packers and Stockyards Act the activities involved supervision over the operations and practices of packers, stockyard companies, market agencies, and dealers, and rates and charges for stockyard services. Under the livestock quarantine laws and regulations the activities included the inspection of all livestock received at public stockyards, enforcement of the 28-hour law, and cooperation with the various States in applying their laws and regulations designed to prevent the introduction of animal diseases.

FORMAL PROCEEDINGS UNDER THE PACKERS AND STOCKYARDS ACT

On July 1, 1933, 9 formal dockets were pending. During the year 29 were instituted and 1 was reopened. Final action was taken on 30 of these cases and 9 were pending on June 30, 1934. Details of each of the formal dockets are given in a separate publication which may be had on request.

CASES IN COURT PERTAINING TO THE PACKERS AND STOCKYARDS ACT

In December 1933, suits were entered in a United States District Court in Kentucky against F. M. Moore and E. W. Crain for failure to register and to give bond as required by the Packers and Stockyards Act. In March 1934, Crain was fined \$25 and costs, and in May the same penalty was assessed against Moore by the court.

On March 28, 1933, a statutory court of three Federal judges sitting in Omaha issued an order temporarily restraining the enforcement of the rates prescribed by the Secretary in docket no. 344, involving the reasonableness of rates and charges made for stockyard services rendered by the Union Stock Yards Co. of Omaha. The order of the court, however, required the stockyard company to post a bond in sufficient amount to insure the payment to shippers of excess charges produced by the existing rates as compared with those prescribed by the Secretary in event the latter are finally upheld. A master was appointed by the court who took further testimony in the matter on November 20, 1933, and final argument of the case on its merits was made before the court on January 29, 1934. A decision had not been rendered at the close of the year.

On July 28, 1933, a statutory court of three Federal judges sitting in Kansas City issued an order temporarily restraining the enforcement of the rates prescribed by the Secretary in docket no. 311, involving the reasonableness of rates and charges made by market agencies for buying and selling livestock on a commission basis at the stockyards in Kansas City, Mo. The order of the court, however, required the petitioners to set aside and account for a sum equal to the excess of the existing rates over those prescribed by the Secretary to be returned to shippers in event the Secretary's rates are finally upheld. On September 29, 1933, an argument was made before the court on a motion by the Government to strike the petitions of the respondents, and on February 27, 1934, final argument of the case on its merits was made before the court. A decision on the matter had not been rendered at the close of the year.

In March 1934, argument was had before the United States Circuit Court of Appeals for the Second Circuit on an application of the Trunz Pork Stores, Inc., of Brooklyn, N. Y., respondent in docket no. 419, to set aside an order of the Secretary requiring the respondent to cease and desist from certain violations of title II of the Packers and Stockyards Act. The court issued an opinion holding that the Secretary's finding of facts justified his conclusion. The court, however, also held that there should be some slight modification of the first paragraph of the order issued by the Secretary requiring the respondent to cease and desist.

On April 19, 1934, a statutory court of three Federal judges issued an order temporarily restraining the enforcement of the rates prescribed by the Secretary in docket no. 402, involving the reasonableness of rates and charges of market agencies for buying and selling livestock on a commission basis at the stockyards in Chicago, Ill. In issuing its order the court required the petitioners to set aside and account for a sum of money equal to the difference between the rates prescribed by the Secretary and those in effect to be returned to shippers in event the Secretary's rates are finally upheld. On June 11, 1934, certain additional oral testimony was made before the court, and the case was set over for final argument on its merits in September 1934.

On May 3, 1934, argument was had before the United States Circuit Court of Appeals sitting in Wilmington, Del., regarding the application of the Wilmington Provision Co., Inc., Wilmington, Del., to set aside an order of the Secretary issued in docket no. 418, requiring respondent to cease and desist from certain violations of title II of the Packers and Stockyards Act. A decision by the court had not been made at the close of the year.

On May 4, 1934, the Secretary issued an order in docket no. 298, prescribing reasonable rates and charges to be made for stockyard services rendered by the St. Joseph Stock Yards Co., South St. Joseph, Mo. The respondent filed an application with a statutory court of three Federal judges for an order restraining the enforcement of the rates prescribed by the Secretary. Owing to the fact that it was not possible to convene this court before the date on which the rates prescribed by the Secretary were to become effective, the date was extended by a supplemental order of the Secretary to July 5, 1934. An interlocutory injunction was issued by the court on June 9, 1934, but no date had been set for hearing the case on its merits up to the close of the year.

STOCKYARDS

On June 30, 1933, there were 93 stockyards posted as coming within the jurisdiction of the act. During the year 8 stockyards were posted and 2 were released. At the close of the year the number of stockyards posted under the act was 99.

REGISTRATIONS

On June 30, 1934, there were 1,402 market agencies and 2,783 dealers registered to operate at posted stockyards. During the year 215 market agencies and 173 dealers were registered, and 187 market agencies and 296 dealers were placed on the inactive list.

RATES AND CHARGES

An oral argument was held and an order prescribing rates was issued for the market agencies operating at the Union Stock Yards, Chicago, Ill., and a hearing was held involving the rates and charges of the market agencies at the Denver Union Stock Yards, Denver, Colo.

An oral argument was held and an order prescribing reasonable rates was issued in the case of the St. Joseph Stock Yards Co., St. Joseph, Mo. The St. Joseph Stock Yards Co. obtained an interlocutory injunction enjoining the Secretary from enforcing the rates prescribed in this order. A hearing was held in a case involving the reasonableness and lawfulness of the rates charged by the Sioux City Stock Yards Co., Sioux City, Iowa.

Appraisals of the lands and property of the Cleveland Union Stock Yards Co., Cleveland, Ohio, and audits of its books and records were made during the year in preparation for a hearing on the reasonableness of its rates. Audits and tabulations of the books and records of market agencies at the stockyards in Fort Worth, Tex., were commenced during the year with a view to holding a hearing on the reasonableness of commission rates at that market during the course of the next fiscal year.

During the year numerous changes in the charges for feed were made by the various stockyard companies, these changes resulting from fluctuations in market prices.

BONDS

Market agencies and dealers generally have complied with the bond regulation, though economic conditions have made it increasingly difficult for registrants to obtain satisfactory bond coverage. In a number of instances the Bureau has accepted trust-fund agreements, under which stocks, bonds, real estate, or other collateral has been placed in trust with a trustee as the substantial equivalent of a bond, and the Bureau has accepted such as being in compliance with the bond regulation. Where bonds were not furnished and informal action failed, formal proceedings were instituted to effect compliance with the regulation.

TRADE PRACTICES

Numerous investigations and reports on general marketing conditions were made by supervisors who also assisted in handling matters relating to the filing of tariffs and regulations of market agencies and stockyard companies. Numerous complaints, involving a variety of subjects, were received, and each was carefully investigated by supervisors and by special investigators in the field. One of these complaints alleged unfair and unjustly discriminatory practices and price fixing by a group of packers in the Southern States. Several months were spent in making preliminary investigations and in tabulating information from many thousands of records relating to sales of meat and meat food products in preparation for a hearing which commenced during the year and was still in progress at its close. As usual, a number of trade-practice audits were made at various markets of the records of both commission firms and dealers, and in some cases conditions were revealed that required the institution of formal proceedings, the substance of which is set out in a digest of dockets in another publication.

SCALES AND WEIGHING

Bureau weight supervisors made visits to practically all posted stockyards during the year and inspected the scales, supervised tests of them, and checked weighing operations in general. Scales found to be defective or not weighing within the tolerance required by the Bureau were subjected to the necessary repairs and corrections, so as to place them in a satisfactory weighing condition. Cooperation by stockyard companies was generally good, and some progress was made in procuring the type of equipment recommended by the Bureau for adequate testing of heavy-duty scales, such as those used for weighing livestock.

AUDITS AND ACCOUNTS

Accountants of the Bureau made additional audits covering operations, for the year 1933, of 16 market agencies at the Denver stockyards in preparation for a commission-rate hearing which was held later at Denver, and at the close of the year were engaged on audits of approximately 35 market agencies at the Fort Worth stockyards, also in preparation for a commission-rate hearing. Another detailed audit of the books and records of the stockyard company at Sioux City was made to cover operations immediately prior to the hearing which was held there as to the reasonableness of the company's rates and charges. A detailed audit of the books and records of the Cleveland stockyards, made for the same purpose, was completed, and a similar audit was begun at the close of the year at the Wichita stockyards. In addition accountants of the Bureau made routine financial audits of the books and records of 11 stockyard companies, trade-practice audits of 18 packers, commission firms, and dealers, and audits to determine solvency in the case of 80 commission firms, dealers, and order buyers at various markets. The force also took an active part in an investigation as to price fixing by packers in certain of the Southern States. Six accountants were detailed to the Agricultural Adjustment Administration for extended periods to assist on related projects.

SUMMARIES OF REPORTS

Information compiled from the annual reports received from packers, stockyard companies, market agencies, and dealers is shown in tables 14 to 19, inclusive. The various reports cover business during the calendar year, with a few exceptions, which are on the basis of the fiscal year.

TABLE 14.—*Financial results of operations during 1933 for 871 packers subject to the Packers and Stockyards Act, grouped according to federally and nonfederally inspected slaughtering and nonslaughtering concerns*

Group	Concerns	Average net worth ¹	Net sales	Net gain
	<i>Number</i>	<i>Dollars</i>	<i>Dollars</i>	<i>Dollars</i>
Federally inspected slaughterers.....	206	709,813,735	1,700,714,741	26,187,832
Nonfederally inspected slaughterers.....	423	55,898,193	166,746,295	204,179
Nonslaughterers ²	242	155,890,084	216,231,403	7,803,308
Total.....	871	921,602,012	2,083,692,439	34,195,319

¹ These figures represent the numerical average of the total net worth of reporting concerns at the beginning and end of their fiscal years.

² This group includes concerns which also handle commodities other than meat food products.

In addition to the complete reports from 871 packing concerns, financial details, lacking in some respects, were received from 15 other packers for the year 1933.

TABLE 15.—*Comparison of the operations of packers subject to the Packers and Stockyards Act, 1929-33*

Item	1929 (832 concerns)	1930 (945 concerns)	1931 (927 concerns)	1932 (868 concerns)	1933 (871 concerns)
Average net worth ¹	\$1,019,980,098	\$1,058,940,521	\$1,057,166,076	\$941,046,982	\$921,602,012
Total income.....	4,308,814,715	4,023,493,741	3,070,743,390	2,204,146,322	2,096,484,225
Total expenses.....	4,243,073,083	3,973,497,594	3,083,939,372	2,212,033,156	2,062,288,906
Net gain.....	65,741,632	49,996,147	² 13,195,982	² 7,886,834	34,195,319
Percentage of gain to net worth.....	6.45	4.72	² 1.25	² 0.84	3.71

¹ These figures represent the average of the total net worth of all reporting concerns at the beginning and end of their fiscal years.

² Loss.

TABLE 16.—*Summary of consolidated balance sheets of 82 posted stockyards at close of year 1933¹*

Assets	Amount	Liabilities	Amount
Current.....	\$6,831,776	Current.....	\$2,943,948
Fixed.....	139,717,874	Other.....	39,082,352
Other.....	11,887,248	Capital and surplus.....	116,410,598
Total.....	158,436,898	Total.....	158,436,898

¹ 6 yards deposited, 11 yards posted too late for tabulation, reports from 2 yards waived, reports from 2 yards not requested, and reports from 3 yards not received for year 1933.

A summary of consolidated profit and loss statements of 82 posted stockyards for the year 1933¹ follows:

Income:		
Yardage.....		\$11,396,025
Feed sales.....		5,292,459
Loading and unloading.....		1,223,154
Rent.....		1,868,160
Miscellaneous operations.....		4,396,463
Gross operating income.....		24,176,261
Expenses:		
Salaries and wages.....		5,208,229
Cost of sales—feed.....		2,478,036
Depreciation.....		2,040,270
Taxes (excluding Federal income tax).....		1,352,711
Miscellaneous operating expenses.....		6,745,233
Total operating expenses.....		17,824,479
Net operating profit.....		6,351,782
Other income.....		472,889
Total.....		6,824,671
Deductions from income.....		1,353,407
Net profit.....		5,471,264

TABLE 17.—*Summary of reports from stockyard companies subject to the Packers and Stockyards Act, 1929–33*

Item	1929 (69 concerns)	1930 (70 concerns)	1931 (67 concerns)	1932 (80 concerns)	1933 (82 concerns)
Total average net worth.....	\$120,360,158	\$122,258,111	\$120,874,011	\$120,391,889	\$118,196,617
Gross income.....	30,157,389	30,646,729	27,791,967	23,812,509	24,649,150
Net gain.....	7,114,989	7,069,624	6,584,478	4,563,510	5,471,264
Percentage of gain to net worth..	5.91	5.78	5.45	3.79	4.63

LIVESTOCK COMMISSION AGENCIES

Number and class of market agencies reporting in 1933 follow:

Old-line agencies.....	658
Cooperative agencies.....	31
Horse and mule agencies.....	11
Total.....	700

TABLE 18.—*Summary of consolidated operating statements of livestock commission agencies, 1931–33*

Item	1931 (680 agencies)	1932 (713 agencies)	1933 (700 agencies)
Total commissions earned.....	\$20,699,222	\$18,460,190	\$19,178,231
Total expenses (exclusive of owners' salaries).....	15,221,131	14,114,122	13,646,983
Net operating profit.....	5,478,091	4,346,068	5,531,248
Other income.....	749,557	747,082	600,109
Other expenses.....	15,512	10,222	20,636
Return to owners.....	6,212,136	5,082,928	6,110,721

¹ 6 Yards deposited, 11 yards posted too late for tabulation, reports from 2 yards waived, reports from 2 yards not requested, and reports from 3 yards not received for year 1933.

TABLE 19.—*Summary of consolidated profit and loss statements of 764 traders on 43 markets for 1933*¹

Item	Dockage ²	Animals handled	Weight	Amount
Cattle:				
571 traders on 39 markets:	<i>Pounds</i>	<i>Number</i>	<i>Pounds</i>	<i>Dollars</i>
Selling data.....		3, 073, 901	1, 732, 028, 131	71, 179, 751
Cost data.....		3, 074, 412	1, 723, 145, 506	67, 824, 794
Sheep:				
66 traders on 27 markets:				
Selling data.....		1, 267, 784	78, 356, 514	5, 044, 105
Cost data.....		1, 268, 501	78, 105, 320	4, 728, 344
Horses and mules:				
10 traders on 5 markets:				
Selling data.....		27, 815		3, 571, 995
Cost data.....		27, 814		3, 319, 911
Hogs:				
174 traders on 32 markets:				
Selling data.....	2, 116, 850	5, 023, 636	1, 055, 558, 059	40, 142, 183
Cost data.....	2, 307, 680	5, 024, 121	1, 047, 139, 394	39, 026, 506
All species:				
764 traders on 43 markets:				
Selling price.....				119, 938, 034
Cost price.....				114, 899, 555
Gross trading profit.....				5, 038, 479
Clearance commissions received.....				60, 479
Other income.....				193, 709
Total earnings.....				5, 292, 667
Expenses:				
Salaries and wages (other than owners').....				941, 434
Clearance commissions paid.....				446, 341
Feed.....				905, 588
Yardage.....				189, 320
Other expenses.....				1, 068, 787
Total.....				3, 551, 470
Return to owners.....				1, 741, 197

¹ Does not include traders who were engaged also in order-buying business. Some of the traders handled more than 1 species.

² Represents deduction in weight at time of sale because of quality or condition of the animal. This practice applies only to hogs.

CONTROL OF INTERSTATE TRANSPORTATION OF LIVESTOCK

In the supervision of the interstate transportation of livestock to prevent the spread of animal diseases, Bureau inspectors at market centers inspected 18,307,131 cattle and 24,023,898 sheep, of which 1,639 cattle and 115,284 sheep were dipped under supervision to comply with the regulations of the Department and the various States to which they were destined. The number of swine inspected was 37,559,036, of which 242,364 were immunized and disinfected against hog cholera under Bureau supervision for distribution for feeding and breeding purposes.

Efforts were continued to reduce losses from infectious disease among stocker and feeder cattle and sheep. Divisions of public stockyards in which such livestock were handled were cleaned and disinfected under Bureau supervision. There were received at Bureau stations 5,808 cars carrying animals affected with communicable diseases. Under Department regulations or on request of Canadian Government, State, and railroad officials, 10,845 cars were cleaned and disinfected under the supervision of Bureau employees.

Experienced veterinary inspectors at public stockyards continued to give particular attention to the inspection of all ruminants and swine for foot-and-mouth disease, no case of which was found.

ENFORCEMENT OF TRANSPORTATION AND QUARANTINE LAWS

In the administration of the 28-hour law many improvements were made in the facilities for feeding, watering, and resting livestock while in transit; 234 alleged violations of the 28-hour law were reported to the Bureau. The Bureau transmitted 139 apparent violations to the Solicitor for presentation to the Attorney General. Penalties amounting to \$9,500 were imposed in cases decided in favor of the Government. Four employees devoted most of their time to this work, but the evidence was collected and the reports prepared largely by employees stationed at public stockyards whose time was devoted chiefly to other lines of work.

Seventy-eight alleged violations of the quarantine laws were reported to the Bureau, and 48 cases of alleged violations were reported to the Solicitor for prosecution. In cases decided in favor of the Government, fines imposed amounted to \$1,200.01, and in one instance a severe jail sentence was imposed in addition to the fine.

PATHOLOGICAL DIVISION

Under the direction of Harry W. Schoening, chief, the Pathological Division has followed its usual line of scientific investigation of the diseases of domestic animals and birds, the poisoning of livestock by plants, and the examination of viruses, serums, and other biological products used in the treatment and prevention of diseases of domestic animals.

DIAGNOSIS AND CONTROL OF DISEASES

Cooperative work for the control and eradication of glanders in the various States was continued. The complement-fixation test was applied to 59 samples of blood serum from animals suspected of being affected with or exposed to the disease. No positive reactions were obtained.

Samples of blood serum from 549 horses in districts where dourine is present or suspected were subjected to the complement-fixation test. No positive reactions were obtained. Blood-serum samples from 11 horses, donkeys, and other animals offered for import were subjected to the complement-fixation test for glanders and trypanosomiasis before the animals were admitted. No positive reactions were obtained.

Ninety-six brain specimens from suspected cases of rabies were received and subjected to laboratory examination. Of these, 76 were from dogs, of which only 1 was positive, and this case originated in West Virginia. In 15 cats, 1 cow, 1 monkey, 3 rats, and 2 squirrels, no evidence of rabies was found. Again this year no positive cases of rabies were diagnosed in animals from the District of Columbia; the last positive case was found in December 1931.

During the year 923 specimens of animals dead from various causes, pathological tissues, cultures, and products from the following sources, were received for examination: 85 equine, 133 bovine, 37 ovine, 105 swine, 354 fowls, 82 rats, 16 dogs, 12 cats, 6 goats, 6 rabbits, and 87 miscellaneous.

During the year 145 stock cultures were carried in the Division's collection, and 158 subcultures of organisms were supplied to various laboratories for use in preparation of biologics and scientific investigations.

TESTING BIOLOGICAL PRODUCTS

Cooperating with the Division of Virus-Serum Control in the enforcement of the Virus-Serum-Toxin Act, the Pathological Division examined a number of samples of biologics, as well as the cultures from which they were prepared. During the year 47 representative samples of serums, vaccines, bacterins, aggressins, filtrates, toxoids, and antitoxins were examined for purity, potency, and safety. Of these, 38 were approved and 9 were found to be unsatisfactory. Examination was made of 110 cultures, of which 82 were found to be true to type and 28 were found to be unsatisfactory for use in the preparation of veterinary biologics.

RESEARCH ON DISEASES

Several phases of the problem of bovine mastitis were investigated. Over a period of 6 weeks, 54 samples of milk from quarters of the udder in which clots had been found by the use of the strip cup were examined bacteriologically. Streptococci were found in 76 percent of these samples, micrococci alone in 18 percent, diphtheroids only in 2 percent, and in 4 percent no bacteria could be detected on blood agar plates or when the incubated milk was spread on Klimmer agar plates. Twenty-one percent of these milk samples were physically changed.

In a group of 41 first-calf heifers, a sample of colostrum was taken from each quarter at the time of parturition before the calf had suckled and was examined bacteriologically. Only 2 quarters, 1 from each of 2 heifers, were found to be carrying streptococci (*Streptococcus fecalis*). These 2 animals were isolated from the remainder of the herd, and samples of milk from each quarter of all animals were examined during the first lactation period with the following results: The *S. fecalis* infection of one of the originally infected heifers disappeared after a short interval, whereas the infection persisted in the other and a new animal acquired the infection in one quarter. *S. agalactiae* was found in 4 other previously clean heifers.

In transmission experiments it was found that mastitis could be induced by introducing as little as 0.1 cc of lactose-saline suspension of *S. agalactiae* into the teat canal. In a test covering 2 months the disease was not transmitted by means of a contaminated milking machine. One of the exposed animals was later proved to be susceptible by direct inoculation with *S. agalactiae*.

In swine-erysipelas studies it was found that the blood of a 20-pound normal pig given 30 cc of anti-swine-erysipelas serum subcutaneously reacted strongly positive to both plate and tube agglutination tests. The reaction persisted for several weeks. The results of the agglutination test in a case of infection in man proved to be very similar to those observed in swine. A negative agglutination test was obtained in a case of diamond skin disease from which *Erysipelothrix rhusiopathiae* was recovered.

Six types of anthrax-immunizing agents (antianthrax serum; antianthrax serum and anthrax spore vaccine in combination; anthrax spore vaccine, single injection; anthrax spore vaccine, intradermic; anthrax spore vaccine in saponin solution; and anthrax bacterin, washed culture) were subjected to comparative tests to determine their relative safety, sensitizing effect, rapidity of immunity production, and the degree and duration of immunity which they produce. The test animals, which were sheep, had had no contact with anthrax infection before or shortly after vaccination. No losses were sustained directly from the vaccination and no sensitization or increased susceptibility to anthrax was demonstrable 4 or 16 days after vaccination. A variation was noted in the rapidity of immunity production, as well as the degree and duration of immunity produced by the different types of anthrax biologics.

Brucella suis was recovered in pure culture from areas of well-marked degeneration and necrosis in the liver and kidney of a hog sent in from the field. In another hog, lesions in the cervical lymph gland, consisting of a number of small, scattered, well-encapsulated abscesses containing whitish gray, cheesy, material which could be easily peeled out, yielded a pure culture of *Br. suis*. In the same animal there were lumbo-sacral vertebral lesions of brucellosis from which *Br. suis* was recovered.

A number of specimens of bovine rumen nodular lesions consisting of small, round, hard, glistening bodies deeply embedded in the mucosa were examined histologically and found to be composed of spheroidal, concentric masses of epithelial cells with the general appearance closely simulating the so-called epithelial pearls. These bodies are nonmalignant and appear to be produced by movements of the stomach acting on exfoliated epithelium and forming a hard, rounded mass. The Pittsburgh meat inspection station reports that of 1,084 cattle examined, 140, or 12.9 percent, showed these lesions in the rumen.

In the latter part of the fiscal year the Pathological Division inaugurated a program to determine the value of sodium bicarbonate as a preventive of shipping fever in cattle. Since sufficient data to warrant conclusions were not obtained, the project is being continued.

Studies on ringworm in cats revealed the rather widespread distribution of this affection. The disease was diagnosed in material obtained from the District of Columbia, Virginia, New York, Texas, Georgia, and California. In all cases the causative agent, *Microsporum felinum*, was isolated and cultivated in pure culture. All cases examined were of the long-haired breed (Persian). The infection was transmitted to common house cats by applying to their abraded skin scrapings from an affected cat. Transmission was also effected by use of a culture from a case in man contracted from a cat. Positive evidence of the "take" occurred in from 10 to 14 days, and spontaneous healing occurred after 2 or 3 months.

Investigations of infectious equine encephalomyelitis were continued, resulting in the recovery of an additional strain of virus from a South Dakota case. Eight strains of virus were recovered from cases in Maryland and Delaware which were demonstrated to be immunologically different from previously encountered strains from west of the Mississippi River.

Studies of experimental transmission in the horse and laboratory animals indicate at least three possible modes of natural infection, which in the order of their apparent likelihood are (1) through the bites of blood-sucking insects, (2) inhalation, (3) through the abraded oral mucosa. Repeated experimental attempts to infect normal animals, either horses or guinea pigs, by continuous intimate contact with infected animals or their environment have consistently failed. The eastern-type virus was, however, transmitted by normal contact to guinea pigs whose plantar pads were repeatedly scarified during contact with guinea pigs which had been inoculated intradermically in the pads of the feet. The vesicular lesions in the pads of guinea pigs were reproduced by serial passage in more than 50 successive groups of animals. With western virus, encephalomyelitis and death occurred regularly up to the nineteenth passage and thence but rarely. With eastern virus, encephalomyelitis and death ensued following plantar inoculations even to the fiftieth passage. Those guinea pigs which survived plantar inoculations were regularly immune to intracerebral inoculation.

Virus was demonstrated in the blood of 2 experimental horses infected with western virus and in 8 horses artificially infected with eastern virus. In general, this viruliferous state coincided with the early phase of the usual febrile reaction. These findings indicate that virus is not an uncommon habitant of the blood stream. Investigations of the use of formalin-treated brain virus as a preventive were continued, leading to a field experiment of some proportions which is now under way, the results depending on the recurrence of the disease in the areas which were involved in the summer and fall of 1933.

The possibility that active virus might be coexistent with antibodies in hyper-immune serum was investigated for the protection of users of such serum. Repeated tests in guinea pigs, which are rather regularly susceptible to even minute quantities of virus, failed to show the presence of virus capable of producing the disease in any of the sera examined. Inoculation of guinea pigs by several methods, including intracerebral, with immune serum which had been deliberately contaminated by the addition of bacteriologically sterile virus-bearing guinea-pig blood, failed to show, even after a prolonged incubation period, that sufficient virus escaped the presumable band by which it was held to produce encephalomyelitis in the inoculated animals. Blood virus placed in normal serum, broth, or immune serum was rendered inactive by heating at 58° C. for 30 minutes or by a week's storage in the dark at average room temperature. Saline suspensions of highly virulent brain virus were completely inactivated by a temperature of 60° for 30 minutes, were distinctly inhibited by a temperature of 55° for 30 minutes, but were still active after being subjected to a temperature of 50° for 30 minutes.

In cooperation with the Zoological Division, studies were undertaken on the application of the complement-fixation test in the diagnosis of anaplasmosis. Specific antigenic substances were demonstrated in infected nymphs and adults of the tick, *Rhipicephalus sanguineus*, when tested against a serum from an active case of the disease experimentally induced. Noninfected adult ticks failed to show antigenic substances. Specific antigenic substances were demonstrated in engorged females of *Boophilus annulatus* obtained from tick-fever-infected cattle when tested with serum of an animal known to be

affected with pure anaplasmosis and with the serum of a second animal known to be affected with piroplasmosis but in which anaplasmosis could not be absolutely excluded. Infected larvae of this species showed similar antigenic value. Mosquitoes (*Aedes aegypti*) which had fed on a carrier of anaplasmosis were permitted to engorge 9 days later on a susceptible splenectomized cow. Transmission of anaplasmosis did not occur as judged by failure of the test cow to react.

INVESTIGATIONS OF STOCK-POISONING PLANTS

Experimental feeding of the following plants to goats had no poisonous effects: Copperleaf, *Acalypha virginica*; chickweed, *Alsine media*; small ragweed, *Ambrosia elator*; camomile, *Anthemis arvensis*; sandwort, *Arenaria serpyllifolia*; spurge, *Chamaesyce preslii*; ivyleaf morning-glory, *Ipomoea hederaceae*; common morning-glory, *I. purpurea*; peppergrass, *Lepidium campestre*; smartweed, *Polygonum pennsylvanicum*; horse nettle, *Solanum carolinense*; black nightshade, *S. nigrum*; crabgrass, *Syntherisma sanguinalis*. Wormseed, *Chenopodium ambrosioides*, was slightly toxic to a goat. Pokeweed, *Phytolacca americana*, was toxic to goats, causing death in one instance; chickens were not affected. *Tetradymia canescens*, a plant suspected of poisoning sheep in Utah, was fed to a sheep with negative results.

A study was made of bighead in sheep and of the conditions under which it occurs. It was found to be largely, but not entirely, a trail disease; that although cases might develop anywhere on the deserts of western Utah and in many places in Idaho, the serious losses have usually occurred in certain more or less restricted areas; that the disease rarely occurs on the deserts of eastern Utah; that sheep which develop the malady have as a rule been living on coarse vegetation low in nutritive value; that although many cases develop in bright sunlight, cases may occur during stormy periods when the sky is clouded over; that in most areas where cases occur either *Tetradymia glabrata* or *T. canescens* grows; and that in the areas considered the most dangerous these plants are the most abundant. They are being fed experimentally at the Salina (Utah) Experiment Station.

Work at that station demonstrated that the local *Delphinium occidentale*, at least that growing in certain areas, is much less toxic than the *D. barbeyi*. This is contrary to former belief. *Tetradymia glabrata*, *Lupinus laxus*, *Astragalus tenellus* have all been found to be poisonous for sheep.

TOXICOLOGICAL INVESTIGATIONS

Studies of the alkaloids of the lupines, *Lupinus palmeri*, *L. barbiger*, *L. laxus*, *L. corymbosus*, and *L. albus* were continued. Several new alkaloids have been isolated.

Three series of tests were made to determine the relative efficiency of antidotes for cyanide poisoning in cattle and sheep with the result that a combination of sodium nitrite and sodium thiosulphate was shown to be superior to any other remedial measures studied. Other toxicological studies are in progress.

BRANCH LABORATORIES

BELTSVILLE

During the year 2,516 fowls were necropsied at the branch pathological laboratory, Beltsville, Md. Lymphomatosis, pox, and roup were the most common diseases encountered. In studies on lymphomatosis, transmission to guinea pigs by intracranial inoculation has thus far failed. In an outbreak of laryngotracheitis, local treatment with the following agents was tried: 1 percent potassium permanganate solution, 1 percent silver nitrate solution, and hydrogen peroxide, but the treatment appeared to be useless.

BETHESDA

Studies were made, at the branch laboratory at Bethesda, Md., on immunization of chickens against infectious laryngotracheitis. Vaccination in the bursa of Fabricius gave fairly uniform protection. Preliminary evidence was

obtained indicating that immunity could be established by vaccination in the conjunctiva, which is considered a more suitable site than the bursa of Fabricius.

Two odorless disinfectants, sodium orthophenylphenate and commercial lye, were found to be effective in destroying the virus of infectious laryngotracheitis, and satisfactory for use in commercial poultry feeding stations in solutions of 1 and 2 percent, respectively.

CHICAGO

A number of cases of spondylitis occurring in porcine brucellosis were studied. It was found that the infection apparently had its origin in the intervertebral disk in the nucleus pulposus and in this respect differed from tuberculous spondylitis, in which infection begins in the center of the body of the vertebra. This point is apparently of diagnostic value in differentiating between the spondylitis of brucellosis and that of tuberculosus.

Epitheloma of the eye of cattle has been studied to determine the occurrence of metastases into other organs. It was found that when the tumorous process had caused rupture of the eyeball, there was metastasis into the parotid lymph glands.

DENVER

There were 4,846 specimens received at the Denver branch pathological laboratory. The larger items included: Specimens from cattle, 2,498; chickens, 1,553; turkeys, 200; pigeons, 193; domestic rabbits, 154; swine, 119; sheep, 76; silver foxes, 44; dogs, 30; horses, 27; and miscellaneous specimens of a wide variety. Approximately 20 percent of 2,047 cattle tested for Bang's disease gave positive reactions. Of nearly 1,000 head of poultry examined, 578 chicks were negative for pullorum disease and 396 positive. Lymphomatosis in its various forms ranked second with 188 cases, whereas nutritional disturbances contributed 134; coccidiosis, 86; and pullorum disease, 75.

A new nematode identified and named *Stephanofilaria stilesi* by the Zoological Division was discovered in lesions of the skin of the ventral region of the body of cattle.

DIVISION OF TICK ERADICATION AND SPECIAL DISEASES

The Division of Tick Eradication and Special Diseases was formed, effective June 1, 1934, by the consolidation of the Tick-Eradication Division and the Division of Hog-Cholera Control, with W. M. MacKellar, chief, and T. P. White, assistant chief.

TICK ERADICATION

Eradiation of the cattle-fever tick was continued in cooperation with State and county officials and southern cattle owners, under the direction of W. M. MacKellar.

At the close of the fiscal year 758 veterinarians and other Bureau employees were working in cooperation with 353 State and 18 county employees engaged in this project. Under their supervision 23,584,779 inspections or dippings of cattle and 2,194,436 inspections or dippings of horses and mules were conducted. More than 12,000 dipping vats were used in the official dippings.

The following areas were released from Federal quarantine as a result of tick-eradication activities: 2 counties, remainder of 2 counties, and parts of 5 counties in Florida; 1 parish, remainder of 2 parishes, and parts of 3 parishes in Louisiana; and 5 counties in Texas. The area of this released territory was 13,208 square miles. No areas were requarantined during the year. At the close of the fiscal year the area remaining under Federal quarantine in continental United States had been reduced to 11 percent of its original size and was confined to parts of Florida, Louisiana, and Texas. Table 20 shows the progress in tick eradication since its beginning in 1906 and gives the status of the work at the close of the fiscal year.

TABLE 20.—*Tick-eradication results July 1, 1906, to June 30, 1934*

State	Counties quarantined on—		Counties released to June 30, 1934	Released counties tick free on Nov. 1—			
	July 1, 1906	June 30, 1934		1930	1931	1932	1933
Alabama.....	67	0	67	64	67	67	66
Arkansas.....	75	0	75	53	55	60	64
California.....	15	0	15	15	15	15	15
Florida.....	67	14	53	33	41	46	44
Georgia.....	158	0	158	158	158	157	158
Kentucky.....	2	0	2	2	2	2	2
Louisiana.....	64	39	25	10	17	10	14
Mississippi.....	82	0	82	78	77	77	79
Missouri.....	4	0	4	4	4	4	4
North Carolina.....	73	0	73	70	73	73	73
Oklahoma.....	61	0	61	61	61	61	60
South Carolina.....	46	0	46	46	46	46	46
Tennessee.....	42	0	42	42	42	42	42
Texas.....	198	36	162	116	113	126	135
Virginia.....	31	0	31	31	30	31	31
Total.....	985	89	896	783	801	817	833

CIVIL WORKS ADMINISTRATION ASSISTANCE

During the year this project received valuable assistance from the C. W. A. In connection with the program of that administration, during the winter of 1933-34, of supplying worth-while work of a public nature in country districts of the South, tick eradication was designated as a civil-works project. The labor and materials needed for the construction and repair of 4,091 dipping vats were supplied in the quarantined area of Florida, Louisiana, and Texas, as follows: In Florida, 260 vats and pens were constructed and 200 repaired; in Louisiana, 1,740 vats and pens were constructed and 1,857 repaired; and in Texas, 25 vats and pens were constructed and 9 repaired.

Formerly in this cooperative work the States and counties furnished such dipping equipment, but owing to depressed conditions, during the year covered by this report, the local authorities could not finance the work on any such scale as was made possible by the help of the C. W. A. This assistance has made it possible, therefore, to extend systematic tick eradication to a much larger area in Florida and Louisiana than would otherwise have been possible. The C. W. A. also assisted Florida and Louisiana by furnishing 103,395 gallons of arsenical cattle dip, 8,800 gallons of cattle-marking paint, 238 spray pumps, 249 paintbrushes, and 539 rolls of barbed wire, in connection with dipping work in those States.

MOVEMENT FROM QUARANTINED AREAS

In the enforcement of Department regulations governing the interstate movement of cattle and horses from the areas quarantined for splenetic, southern, or tick fever, 104,618 cattle were inspected, or dipped and inspected, for which 2,103 certificates were issued authorizing their interstate movement as non-infectious. Horses and mules to the number of 4,043 were also inspected in the quarantined areas, and 501 certificates were issued authorizing their movement from such areas. In connection with these movements 845 cars were cleaned and disinfected.

HOG-CHOLERA CONTROL

U. G. Houck, associate chief of the Bureau, continued as Chief of the Division of Hog-Cholera Control until his death, April 24, 1934. From that date to June 1, 1934, T. P. White, assistant chief, directed the work, and on the latter date, the work of hog-cholera control and tick eradication were merged into the new division. Approximately 30 veterinarians continued their efforts in the investigation and suppression of outbreaks of hog cholera and allied swine diseases. The number of visits made to farms and other premises where hogs were kept was 25,492. Of this number, 6,643 visits were in response to calls for assistance and 18,849 were voluntary to survey the status of hog cholera and other swine diseases.

Continuing the educational phase of hog-cholera control, Bureau veterinarians attended 245 meetings and addressed 142 of them. These meetings were attended by 21,810 persons interested in the subjects discussed, including the control of hog cholera and other infectious and contagious diseases of swine. Demonstrations in the use and efficiency of the serum treatment were given in 1,490 herds comprising 29,585 hogs.

During the year there were reported to Bureau veterinarians 4,123 outbreaks of hog cholera, which was 235 less than in the previous year. Table 21 summarizes the activities of the year.

TABLE 21.—*Summary of hog-cholera-control work, fiscal year 1934*

State	Bureau veterinarians engaged in work ¹	Meetings addressed	Demonstrations		Post-mortem examinations	Outbreaks reported to Bureau veterinarians
			Number	Hogs treated		
Alabama.....	1	3	43	326	22	14
Florida.....	1	8	317	5,554	20	11
Georgia.....	1	3	2	15	23	84
Illinois.....	3	16	3	205	687	648
Indiana.....	2	13			150	236
Iowa.....	2	14	12	1,021	359	772
Kansas.....	.5				11	28
Kentucky.....	2	18	5	471	199	181
Louisiana.....	1		88	1,632	10	60
Maryland.....	2	16	6	126	137	431
Michigan.....	1		18	846	36	308
Mississippi.....	1	11	5	568	6	0
Missouri.....	1	11	13	1,688	114	81
Nebraska.....	1		9	434	175	43
North Carolina.....	.7	3	85	5,420	68	44
Ohio.....	1.5	1	12	468	87	431
Oklahoma.....	1.5	5	1	48	37	129
Oregon.....	.25				1	21
South Carolina.....	1	1	488	6,105	28	42
South Dakota.....	1		43	2,652	33	139
Tennessee.....	.7	10	74	547	54	177
Texas.....	1				16	62
Virginia.....	1	4	266	1,459	50	39
Washington.....	.75	2			17	10
Wisconsin.....	1	3			58	132
Total.....	29.90	142	1,490	29,585	2,398	4,123

¹ Fractions denote veterinarians devoting part time to the work.

TUBERCULOSIS ERADICATION DIVISION

Tuberculosis eradication in cooperation with the various States, counties, and livestock owners made substantial progress. This work on the part of the Bureau was directed by A. E. Wight, chief of the division. The year's activities consisted largely in the tuberculin testing of cattle under the area plan. Altogether, 15,119,763 tuberculin tests were applied to cattle. The percentage of reactors was 1.5 whereas for the fiscal year 1933 it was 2.0.

The Bureau's force engaged in tuberculosis eradication averaged 185 veterinarians who were under the supervision of inspectors in charge of 44 field stations. The respective States had under the jurisdiction of their livestock officials an average of 314 veterinarians, a small number of whom were employed by municipalities. In addition, counties cooperating with the officials of the States and the Bureau employed an average of 331 veterinarians on full time. Thus, 830 veterinarians were engaged in the work regularly throughout the year, which is an increase of approximately 47 full-time employees compared with the preceding year.

In January 1934, Federal funds furnished by the C. W. A. were made available for use in the tuberculin testing of cattle. This work was continued for about 3 months, and during that time 917,401 tuberculin tests were applied to cattle by veterinarians paid from these funds. The work was taken up in eight States.

The Federal appropriation for the work was \$4,445,360, of which \$3,300,000 was for indemnity, and the remainder of \$1,145,360 for operating expenses. The combined State and county appropriations amounted to approximately \$11,000,000.

The results of tests of cattle with either johnin or avian tuberculin for the detection of paratuberculosis showed the disease existed to a slight degree in 11 States. Altogether, 198 cattle were condemned on account of this disease, or approximately 5.5 percent of the total number tested. The diagnosis of this disease with johnin was very satisfactory.

RESULTS OF BIENNIAL SURVEY

The seventh survey to determine the approximate extent of bovine tuberculosis in the various counties in the United States was completed May 1, 1934. This survey indicated that the approximate degree of disease among cattle had been reduced to 1.1 percent. The first survey, made in 1922, indicated that 4 percent of all the cattle in this country were affected with tuberculosis. In the last survey, it was found that in only 62 counties in 9 States was the degree of infection more than 7 percent, and in only 17 counties in 5 States was the infection more than 15 percent.

PROGRESS IN TUBERCULIN TESTING OF CATTLE

The numbers of herds and cattle under supervision at the end of the year were 4,314,614 and 39,024,279, respectively. Reports of officials of 34 States and the District of Columbia showed that more than 50 percent of the cattle in those areas were under supervision for the eradication of tuberculosis. As an indication of the continued interest in the work throughout the United States, there was at the end of the year a waiting list of 2,500,000 cattle. Table 22 shows that from the fiscal year 1917 to 1934, inclusive, 2,925,938 reactors had been removed from the cattle herds of the Nation.

TABLE 22.—Progress of tuberculin testing under accredited-herd and area plans 1917-34

Year ended June 30—	Cattle tested				Modi- fied ac- credited coun- ties	Herds ac- credited ¹	Herds passed one test ¹	Herds under super- vision ¹
	Accredited herd plan	Area plan	Total	Reactors found and removed				
	Number	Number	Number	Number	Per- cent	Number	Number	Number
1917	20, 101		20, 101	645	3.2			
1918	134, 143		134, 143	6, 544	4.9	204	883	
1919	329, 878		329, 878	13, 528	4.1	578	5, 652	
1920	700, 670		700, 670	28, 709	4.1	2, 588	10, 064	
1921	1, 366, 358		1, 366, 358	53, 768	3.9	4, 831	33, 215	71, 806
1922	1, 722, 209	2 662, 027	2, 384, 236	82, 569	3.5	8, 015	111, 719	140, 376
1923	1, 695, 662	1, 765, 187	3, 460, 849	113, 844	3.3	12, 310	150, 748	187, 915
1924	1, 865, 863	3, 446, 501	5, 312, 364	171, 559	3.2	38	216, 737	305, 809
1925	2, 008, 526	4, 991, 502	7, 000, 028	214, 491	3.1	51	24, 110	392, 740
1926	1, 989, 048	6, 661, 732	8, 650, 780	323, 084	3.7	109	24, 009	382, 674
1927	2, 522, 791	7, 177, 385	9, 700, 176	285, 361	2.9	149	34, 084	229, 086
1928	2, 589, 844	8, 691, 646	11, 281, 490	262, 113	2.3	180	38, 880	427, 595
1929	2, 853, 633	8, 830, 087	11, 683, 720	206, 764	1.8	213	1, 639	249, 420
1930	2, 953, 350	9, 892, 521	12, 845, 871	216, 932	1.7	236	11, 863	227, 921
1931	3, 086, 403	10, 695, 870	13, 782, 273	203, 778	1.5	247	26, 259	350, 735
1932	3, 131, 426	10, 312, 131	13, 443, 557	254, 785	1.9	220	18, 049	262, 988
1933	2, 980, 526	10, 093, 368	13, 073, 894	255, 096	2.0	183	19, 701	337, 730
1934	2, 826, 257	12, 293, 506	15, 119, 763	232, 368	1.5	189	31, 460	342, 262
Total.	34, 776, 688	95, 513, 463	130, 290, 151	2, 925, 938	2.2	⁴ 1, 815	225, 809	3, 732, 169
								4, 314, 614

¹ The figures in these columns represent net increases at the close of each year.

² Testing during 6 months.

³ Represents decrease from figures for previous year.

⁴ Not including part of 2 counties and 77 towns.

ERADICATION OF TUBERCULOSIS FROM AREAS

The work under the area plan of eradication has continued to grow. Approximately 81 percent of all the cattle tested during the year were tested under the area plan. The tuberculin testing of all cattle in Kentucky, West Virginia, and Washington was completed, and these States were declared modified accredited areas, signifying that tuberculosis among their cattle did not exceed 0.5 percent. These States make a total of 14 so classified.

At the end of the year the modified accredited area included 1,815 counties, part of 2 other counties, and 77 towns. This is in comparison with 1,626 counties, part of 1 other county, and 74 towns at the end of the previous fiscal year. At the end of the fiscal year 1934, 59.1 percent of all the counties in the United States were modified accredited areas and, including such counties, 67.6 percent of all the counties in the United States were engaged in eradicating the disease in cattle. Table 23 shows the status of area work on June 30, 1934.

TABLE 23.—*Status of tuberculosis eradication from county areas at close of fiscal year 1934*

State ¹	Total counties in State ¹	Counties completing one or more tests of all cattle ¹	Counties intensively engaged in testing	Total counties engaged ¹	Modified accredited areas ¹
Alabama.....	67	24	3	27	24
Arizona.....	14	0	10	10	0
Arkansas.....	75	9	4	13	9
California.....	58	7	21	28	6
Colorado.....	63	0	2	2	0
Connecticut.....	8	2	3	5	2
Delaware.....	3	1	1	2	1
District of Columbia.....	1	1	0	1	1
Florida.....	67	52	2	54	51
Georgia.....	159	83	6	89	81
Idaho.....	44	44	0	44	44
Illinois.....	102	100	2	102	100
Indiana.....	92	92	0	92	92
Iowa.....	99	87	12	99	84
Kansas.....	105	64	1	65	64
Kentucky.....	120	120	0	120	120
Louisiana.....	64	0	0	0	0
Maine.....	16	16	0	16	16
Maryland.....	23	12	7	19	6
Massachusetts.....	14	3	0	3	3
Michigan.....	83	83	0	83	83
Minnesota.....	87	87	0	87	72
Mississippi.....	82	15	0	15	14
Missouri.....	114	38	6	44	38
Montana.....	56	² 24	² 7	² 31	² 24
Nebraska.....	93	50	3	53	49
Nevada.....	17	17	0	17	17
New Hampshire.....	10	10	0	10	10
New Jersey.....	21	4	17	21	4
New Mexico.....	31	11	20	31	11
New York.....	62	40	21	61	32
North Carolina.....	100	100	0	100	100
North Dakota.....	53	53	0	53	53
Ohio.....	88	88	0	88	88
Oklahoma.....	77	18	1	19	18
Oregon.....	36	34	2	36	34
Pennsylvania.....	67	51	15	66	51
Rhode Island.....	5	1	0	1	1
South Carolina.....	46	36	1	37	36
South Dakota.....	69	6	0	6	3
Tennessee.....	95	² 63	² 5	69	² 63
Texas.....	254	26	10	36	26
Utah.....	29	29	0	29	29
Vermont.....	14	³ 2	³ 12	³ 14	³ 2
Virginia.....	100	86	14	100	86
Washington.....	39	39	0	39	39
West Virginia.....	55	55	0	55	55
Wisconsin.....	71	71	0	71	71
Wyoming.....	23	2	11	13	2
Total.....	3,071	1,856	219	2,076	⁴ 1,815

¹ Including District of Columbia.

² Not including part of 1 county.

³ Not including 77 towns.

⁴ Not including part of 2 counties and 77 towns.

ERADICATION OF TUBERCULOSIS FROM SWINE AND POULTRY

The control and eradication of the avian type of tuberculosis have been a part of the regular program for the eradication of tuberculosis from livestock. During the year, 12 Bureau veterinarians were assigned to this project in the more heavily infected sections, which are the Midwestern and North Central States. Their work was done in cooperation with the State livestock sanitary officials, who were able to assign a few veterinarians to the project. The

employees engaged in these activities visited 17,380 farms and inspected approximately 2,498,207 fowls, finding the disease on 5,232 farms.

A considerable number of swine were found to be infected with the avian type of the disease. The owners of these infected animals were informed that swine become infected through water and feed contaminated with the droppings of tuberculous fowls. Literature was furnished to the owners, who were also invited to visit meetings where the subject was discussed.

The survey of farm poultry flocks, begun several years ago, in connection with the testing of cattle, was continued. During the year 149,915 flocks containing approximately 13,950,000 fowls, in 21 States, were observed. Of these flocks, 3,468 were found to be infected with tuberculosis. As the inspections were made by the veterinarians engaged in the testing of cattle, the work involved little additional cost to the Department or the State.

STATISTICS OF SLAUGHTER AND INDEMNITY

There was a slight increase in the average amount received as salvage for condemned tuberculous cattle. Appraisals were slightly reduced. Salvage and appraisal values are given in table 24.

TABLE 24.—*Cattle slaughtered, appraised value, indemnity allowed, and salvage realized, in work of tuberculosis eradication, fiscal year 1934*

State or Territory	Cattle slaughtered	Average appraisal per head	Indemnity		Average indemnity per head		Average salvage per head
			State	Federal	State	Federal	
	<i>Number</i>						
Arizona.....	203	\$26.73	\$907.52	\$907.52	\$4.47	\$4.47	\$13.54
California.....	8,130	44.94	79,855.30	79,855.30	9.82	9.82	15.59
Colorado.....	5	95.00	118.97	118.97	23.79	23.79	17.35
Connecticut.....	5,299	49.93	133,102.91	66,000.04	25.12	12.46	12.34
Delaware.....	388	57.78	9,207.36	6,016.26	23.73	15.51	10.33
Florida.....	150	30.89	2,485.24	1,241.87	16.57	8.28	6.02
Georgia.....	51	42.45	638.65	638.65	12.52	12.52	4.89
Hawaii.....	192	124.54	5,746.23	3,651.36	29.95	19.02	26.24
Idaho.....	88	39.73	1,110.07	1,110.07	12.61	12.61	1.87
Illinois.....	4,512	51.67	55,501.09	55,501.09	12.30	12.30	14.20
Indiana.....	1,017	58.50	15,766.01	15,221.72	15.50	14.97	12.05
Iowa.....	17,901	53.14	246,431.74	243,151.61	13.77	13.58	11.91
Kansas.....	466	40.18	4,598.71	4,597.22	9.87	9.87	10.74
Kentucky.....	194	30.50	2,812.57	1,266.30	14.50	6.53	6.72
Louisiana.....	255	30.12	3,115.77	2,076.85	12.22	8.14	5.68
Maine ¹	131	37.54	3,005.33	1,281.33	22.94	9.78	8.07
Maryland.....	1,506	65.30	26,070.07	26,070.07	17.31	17.31	13.43
Massachusetts.....	10,173	62.35	249,654.67	156,843.59	24.54	15.42	13.93
Michigan.....	670	47.99	16,132.50	7,163.97	24.08	10.69	11.65
Minnesota.....	8,620	42.99	113,475.92	91,860.83	13.16	10.66	11.87
Mississippi.....	29	25.34	245.30	245.30	8.46	8.46	0
Missouri.....	459	41.69	4,379.74	4,379.74	9.54	9.54	11.76
Montana ¹	289	34.33	4,733.18	2,587.93	16.38	8.95	3.19
Nebraska.....	875	44.08	8,793.78	8,555.42	10.05	9.78	12.56
Nevada.....	63	39.10	615.02	538.80	9.76	8.55	12.02
New Hampshire.....	478	56.46	13,097.51	6,898.21	27.40	14.43	12.07
New Jersey.....	6,906	71.34	227,997.39	117,155.87	33.01	16.96	18.20
New Mexico.....	161	27.73	1,458.03	1,458.03	9.06	9.06	.50
New York.....	41,400	56.37	1,311,161.11	595,564.94	31.67	14.39	10.30
North Carolina.....	72	117.14	1,480.36	1,463.30	20.56	20.32	12.25
North Dakota.....	556	24.70	3,287.40	3,224.40	5.91	5.80	7.69
Ohio.....	4,563	55.97	64,087.28	61,145.11	14.04	13.40	14.89
Oklahoma.....	1,116	24.52	9,377.89	7,385.50	8.40	6.62	5.37
Oregon.....	361	60.62	5,140.76	5,140.76	14.24	14.24	8.67
Pennsylvania.....	21,155	66.68	584,572.14	350,402.41	27.63	16.56	14.10
Rhode Island.....	2,011	75.14	75,429.00	36,813.85	37.51	18.31	13.67
South Carolina.....	9	39.22	111.53	111.53	12.39	12.39	2.09
South Dakota.....	604	46.84	7,434.56	7,431.77	12.31	12.30	9.60
Tennessee.....	330	42.63	3,922.44	3,879.63	11.89	11.76	6.90
Texas.....	844	54.37	10,000.40	10,000.40	11.85	11.85	6.12
Utah.....	201	57.94	3,276.75	3,273.93	16.30	16.29	6.91
Vermont.....	25,495	46.00	321,112.56	320,990.54	12.60	12.59	5.63
Virginia.....	634	46.97	7,685.55	7,614.72	12.12	12.01	10.57
Washington.....	1,033	59.63	16,308.03	16,260.09	15.79	15.74	11.36
West Virginia.....	59	39.95	837.32	618.72	14.19	10.49	6.17
Wisconsin.....	3,411	56.69	50,879.19	50,218.44	14.92	14.72	13.33
Wyoming.....	184	41.55	2,100.70	2,099.82	11.42	11.41	6.85
Total.....	173,249	54.80	3,709,261.55	2,390,033.78	21.41	13.80	11.45

¹ Salvage paid to State.

REGULATIONS OF INTERSTATE MOVEMENT OF CATTLE

Under the provisions of regulation 7 of B. A. I. order 309, approved veterinary practitioners throughout the 48 States continued to conduct most of the tuberculin testing for interstate shipments of cattle. On June 30, 1934, there were on the list more than 10,227 veterinarians, who, under a cooperative plan, are approved by the State and Federal livestock sanitary officials to perform this work. These men tested for interstate shipment 25,146 lots containing 204,243 cattle, of which 0.08 percent reacted. The number tested was an increase of 27,522 as compared with the number reported during 1933.

In an effort to assist livestock owners in facilitating the interstate movement of cattle, Bureau inspectors tested, under the provisions of the regulations, at public stockyards, 26,528 cattle, of which 0.2 percent reacted. These figures of testing by Bureau and approved veterinarians are included in the total testing for the year as reported in table 22.

DIVISION OF VIRUS-SERUM CONTROL

The Division of Virus-Serum Control, directed by D. I. Skidmore, chief, conducted the administrative and regulatory work authorized by the Virus-Serum-Toxin Act.

WORK AT LICENSED ESTABLISHMENTS

At the close of the year supervision was exercised over 83 licensed establishments as compared with 84 last year. These establishments were distributed among 63 cities and towns in 21 States. At the close of the year 41 establishments were engaged in producing only anti-hog-cholera serum and hog-cholera virus, 36 were producing other biologics only, and 6 were producing both classes of products.

Bureau inspectors examined 390,797 hogs and 1,020 calves intended for use in licensed establishments. Of these, 278 hogs were rejected at the time they were offered for admission, and 20,499 hogs were rejected because of conditions developing later which made them unsuitable for use. The total number of animal inspections was 2,589,274. Bureau inspectors supervised 3,978 potency and 3,414 purity tests of anti-hog-cholera serum and 2,536 purity tests of simultaneous virus.

Table 25 shows the quantities of biologics produced by licensed establishments under the Bureau's supervision. Of the total quantity of anti-hog-cholera serum produced, approximately 6 percent was defibrinated-blood serum and 94 percent was clarified serum. The corresponding percentages for the previous year were 9 and 91.

TABLE 25.—*Biological products produced by licensed establishments, fiscal year 1934*

Product	Quantity	Product	Quantity
Anti-hog-cholera serum and hog cholera virus:	<i>Cubic centimeters</i>	Antisera and sera—Continued	<i>Doses</i>
Serum.....	919,111,443	Bronchisepticus serum (canine)....	7,397
Virus (simultaneous).....	52,771,943	Distemper serum (canine).....	387,416
Virus (hyperimmunizing).....	173,729,110	Distemper, influenza, and pneumonia serum (equine).....	48,025
Virus (inoculating).....	645,792	Encephalomyelitis serum (equine)....	9,149
		Erysipelas serum (porcine).....	143,341
Aggressins:	<i>Doses</i>	Hemorrhagic septicemia serum.....	114,864
Anthrax aggressin.....	65,370	Mastitis serum (bovine).....	4,096
Blackleg aggressin (natural).....	6,103,354	Mixed infection serum (avian).....	23,500
Blackleg aggressin (cultural).....	1,461,830	Mixed infection serum (canine).....	124,049
Hemorrhagic septicemia aggressin.....	2,255,022	Mixed infection serum (porcine).....	6,575
Total.....	9,885,576	Navel-ill serum (equine).....	4,990
		Normal serum.....	8,669
Antisera and sera:		Scours serum (bovine).....	31,053
Abortion serum (bovine).....	1,517	Scours serum (feline).....	6,606
Anthrax serum.....	380,659	Scours serum (porcine).....	1,060
Blackleg serum.....	5,361	Venom serum.....	381
		Total.....	1,308,708

TABLE 25.—*Biological products produced by licensed establishments, fiscal year 1934—Continued*

Product	Quantity	Product	Quantity
	<i>Units</i>		<i>Doses</i>
Botulinus antitoxin.....	141,420,000	Bacterins—Continued	
Tetanus antitoxin.....	310,217,505	Scours bacterin (porcine).....	188,420
Total.....	451,637,505	Staphylococcus bacterin.....	7,819
		Streptococcus bacterin.....	6,201
		Total.....	18,469,588
Bacterins:	<i>Doses</i>	Vaccines and viruses:	
Abortion bacterin (equine).....	3,541	Abortion vaccine (bovine).....	140,400
Anthrax bacterin.....	84,520	Anthrax vaccine.....	1,929,555
Autogenous bacterin.....	110,950	Blackleg vaccine.....	1,792,043
Bacillus hemolyticus bacterin.....	47,375	Distemper vaccine (canine).....	79,660
Blackleg bacterin.....	4,107,472	Distemper virus (canine).....	35,236
Cholera-typhoid bacterin (avian).....	1,043,270	Erysipelas vaccine (porcine) (for export only).....	264,840
Distemper bacterin (feline).....	2,750	Infectious laryngotracheitis vaccine.....	1,021,500
Distemper, influenza, and pneumonia bacterin (equine).....	452,511	Pox vaccine (fowl).....	8,911,185
Hemorrhagic septicemia bacterin.....	3,439,005	Rabies vaccine.....	583,089
Keratitis bacterin (bovine).....	296,346	Staphylococcus toxoid.....	10,580
Mastitis bacterin (bovine).....	314,586	Tetanus toxoid.....	6,148
Metritis bacterin (bovine).....	17,794	Total.....	14,774,236
Metritis bacterin (equine).....	2,859	Diagnostic agents:	
Mixed bacterin (avian).....	5,060,411	Johnin.....	671
Mixed bacterin (bovine).....	357,426	Mallein (intradermic).....	1,650
Mixed bacterin (canine).....	896,151	Mallein (ophthalmic).....	59,295
Mixed bacterin (equine).....	100,905	Mallein (subcutaneous).....	618
Mixed bacterin (feline).....	10,796	Pullorin.....	249,600
Mixed bacterin (lepine).....	11,630	Tuberculin (intradermic).....	1,734,425
Mixed bacterin (ovine).....	196,485	Tuberculin (ophthalmic).....	41,020
Mixed bacterin (porcine).....	667,114	Tuberculin (subcutaneous).....	17,829
Navel-ill bacterin (equine).....	56,905	Tuberculin (avian).....	320,642
Plague bacterin (porcine).....	960	Total.....	2,425,750
Pulmonary bacterin (bovine).....	497,385		
Pulmonary bacterin (porcine).....	193,144		
Rhinitis bacterin (porcine).....	3,370		
Roup bacterin.....	160,969		
Scours bacterin (bovine).....	130,518		

Table 26 shows the quantities of biological products destroyed under the Bureau's direction as unfit for use. Most of these were rejected and destroyed in the course of preparation, but some were recalled from the market for destruction.

TABLE 26.—*Biological products rejected and destroyed under Bureau supervision, fiscal year 1934*

Product	Quantity	Product	Quantity
	<i>Cubic centimeters</i>		<i>Cubic centimeters</i>
Abortion bacterin (bovine).....	263,930	Hyperimmunizing virus (hog cholera):	
Abortion bacterin (porcine).....	28,630	From animals found diseased.....	4,411,997
Abortion vaccine (bovine).....	22,825	Contaminated and otherwise unfit.....	390,026
Blackleg aggressin.....	5,750	Simultaneous virus (hog cholera):	
Pulmonary bacterin (bovine).....	300	From animals found diseased.....	1,022,090
Anti-hog-cholera serum:		Contaminated and otherwise unfit.....	1,689,034
From animals found diseased.....	3,716,550	Total.....	12,795,020
Contaminated and otherwise unfit.....	1,243,888		

IMPORTS AND EXPORTS OF BIOLOGICAL PRODUCTS

The importation of veterinary biological products from foreign countries continued to be handled by the Bureau in cooperation with the Treasury and Post Office Departments and the Food and Drug Administration of the Department of Agriculture. At the close of the year two permits to import such products were outstanding. Thirty-two shipments of biologics were offered for admittance to this country. Twenty-nine of these, upon examination by Bureau inspectors, were found to be biologics which had been exported from the United States but were returned for various reasons. The remaining three shipments were admitted.

Bureau inspectors issued 507 certificates to accompany shipments of veterinary biological products to foreign countries. These certificates covered the following quantities of products: Anti-hog-cholera serum, 13,111,650 cubic centimeters; hog-cholera virus, 671,930 cubic centimeters; aggressins, 298,097 doses; bacterins, 385,203 doses; diagnostic agents, 87,199 doses; sera and antisera, 61,195 doses; botulinus and tetanus antitoxins, 2,626,000 units; vaccines, 272,268 doses. The total quantity of anti-hog-cholera serum exported is not known but the total quantity reported to the Bureau as having been exported aggregated 19,672,396 cubic centimeters.

ZOOLOGICAL DIVISION

The scientific investigation of animal parasites and the development of control measures along the lines of medicinal treatment of infested stock and prevention by sanitary procedures were continued under the direction of Maurice C. Hall, chief.

PARASITES OF HORSES

The preparasitic development of three species of nematodes parasitic in horses was traced in more or less detail, and the results obtained will facilitate the identification of the infective larvae. The species were: *Poteriostomum ratzii*, *Cylicodontophorus ultrajectinus*, and *Cylicocercus pseudocatinatus*.

Further progress was made in experiments designed to develop practical methods of destroying eggs and larvae of horse parasites in manure, in order to render this manure safe for spreading on pastures. Manure was placed in large insulated containers to which steam at a pressure of about 25 pounds was admitted through an insulated pipe. This treatment was effective in destroying eggs and larvae in all parts of the box. In determining the possibility of destroying nematode eggs and larvae in stored liquid manure, it was found that the larvae were very resistant; the eggs hatched and the larvae survived for 18 days at a depth of 8½ feet.

In a continuation of tests to determine the migration in various types of soil of infective larvae of nematodes parasitic in horses, previous observations indicating that these larvae did not migrate in clay soil were confirmed. In sandy soil containing a small percentage of clay, larvae reached the surface of the soil from depths as great as 8 inches.

PARASITES OF RUMINANTS

NEMATODES

The condition known as nasal granuloma of cattle in the dairy herd at the Iberia Livestock Experiment Farm, Jeanerette, La., was found not to be due to animal parasites. There is evidence that this disease may be due to a fungus.

A skin disease of cattle due to a nematode of the genus *Stephanofilaria* Ihle and Ihle-Landenberg (1933) has been found to occur in South Dakota, Colorado, Wyoming, Nebraska, Kansas, Oklahoma, and Texas. The nematode has been described as *S. stilesi*. Investigations of its distribution, seasonal manifestations, and life history are in progress.

Trichostrongylus longispicularis, first reported as a parasite of sheep in Australia, has been found among trichostrongylids collected from the abomasum of cattle in Louisiana.

TREMATODES

The life history of the large American liver fluke, *Fascioloides magna*, previously determined on the basis of comparative studies of larval stages found in naturally infected snails, was demonstrated experimentally, the snail *Galba bulimoides techella* being used as the intermediate host and a sheep as the final host. Eggs of the fluke first appeared in the feces of the sheep 181 days after the animal had been given encysted cercariae. Several attempts to infect cattle experimentally with *F. magna* were unsuccessful.

One new snail intermediate host for the common sheep liver fluke, *Fasciola hepatica*, was determined under laboratory conditions. This snail, *Lymnaea traskii*, was found to be susceptible to infection only when very young, a fact which explains previous unsuccessful attempts to infect mature snails of this species and failure to find snails naturally infected in pastures which were

known to be fluky. In an experiment to determine the viability of eggs of the common liver fluke, eggs kept in a refrigerator at about 45° F. for more than 2½ years were viable, and miracidia hatching from these eggs were able to infect snails.

The life history of an amphistome fluke, *Cotylophoron* sp., from cattle in Virginia was ascertained and found to be similar to that of related flukes; the snail *Pseudosuccinea columella* was a satisfactory intermediate host. Both sheep and cattle were infected experimentally with cercariae obtained from the experimentally infected snails.

Tests of copper ores indicated that although some of them are as effective as copper sulphate for destroying snails, they are more difficult to use than is copper sulphate and are about as expensive. Some copper ores were ineffective, and others much less effective than copper sulphate. The latter in strengths effective against the snail hosts of the liver fluke was ineffective against planorbis snails. The fluke-carrying snails thrive in water with a hydrogen-ion concentration of 7.2 to 8.4, but die in a concentration below 7.2.

Cooperative experiments with the Federal Bureau of Fisheries and the Utah Game and Fish Department showed that under certain conditions copper sulphate, added to a trout stream to make a 1:500,000 solution, for 24 hours, killed some trout; all snails apparently were killed for 1.1 miles below the points of application of the copper sulphate, and some below this. The copper sulphate did not injure such fish food as caddis-fly larvae.

PROTOZOA

Dairy herds in Orleans Parish, La., in which cases of anaplasmosis have occurred yearly for several years, were examined for ticks through the co-operation of the Tick Eradication Division of the Bureau and a practicing veterinarian of New Orleans, La., who has had extensive experience with this disease for the last 10 years. Six dairy herds comprising an average total of 140 animals were examined every 3 or 4 days from May 1 to November 23, 1933. Twenty cases of anaplasmosis were diagnosed in this group of animals during the period of examination, but no ticks were reported as having been found on these animals. The work is being continued.

Anaplasma marginale appears to be digested by the ticks *Dermacentor variabilis* and *D. andersoni*, according to results obtained. It could not be differentiated in the epithelial cells of the tick's digestive tract when the tick was in the stage that ingested it nor in the salivary glands of the next stage of the tick that transmitted anaplasmosis to susceptible cattle. This finding suggests that the etiological agent of the disease is probably ultramicroscopic in the tick. Large quantities of whole blood (300 to 500 cubic centimeters) of cattle that were carriers, injected into cattle that had clinical anaplasmosis, did not have any beneficial therapeutic action. In splenectomized carriers such injections produced relapse. By repeated injections, splenectomized carriers have been maintained indefinitely in a clinical or subclinical state and thus have been better sources of infection for ticks engorging thereon than were the non-splenectomized carriers.

The ticks *Boophilus annulatus* and *Rhipicephalus sanguineus*, infected with anaplasmosis, triturated in physiologic saline, and injected intravenously into susceptible cattle, failed to transmit anaplasmosis or to produce immunity. These results followed when the tick emulsion was filtered through a Seitz filter and also when it was unfiltered. By engorging on susceptible cattle, other specimens of *B. annulatus* from the same lot as that mentioned transmitted *Babesia argentina*, and other specimens of *R. sanguineus* from the same lot as that mentioned transmitted anaplasmosis. Intradermic injections of macerated *R. sanguineus* that were infected with anaplasmosis failed to show any localized reaction in carrier or susceptible cattle.

In a cooperative project, the Zoological Division and the Pathological Division have determined that *R. sanguineus*, infected with the etiological agent of anaplasmosis, develops antigen which may be liberated by triturating the ticks in distilled water. Antigens occurred also in *B. annulatus* that engorged on carriers of piroplasmosis and probably of anaplasmosis also. Test antigens thus prepared have served in complement fixation to differentiate between clinical cases and susceptible cattle.

Isoagglutinins were demonstrated in cattle. Their occurrence makes it highly desirable to determine blood groups before practicing blood or serum therapy in cattle.

ARTHROPODA

Experimental work on eradication of cattle grubs in Prowers County, Colo., has extended over a period of 6 years. Beginning in December 1928, 35 grubs per animal, on an average, were extracted from 3,616 cattle in 48 herds at an average labor cost of 17 cents per head. The area worked embraced approximately 150 square miles, which was enlarged at various times. Last year the area was further enlarged so that it extended 33 miles north and south and 27 miles east and west, including a total of 891 square miles. Results of grub eradication for the entire area were as follows: Cattle, 22,374; herds, 1,033; average number of grubs per animal, 11.3; and labor cost, 10.5 cents per head for labor paid 42 cents an hour. The central zone, consisting of the area worked the first year, has been systematically worked for 6 years. The average number of grubs per animal in this zone for each year beginning with the first year is as follows: 35, 30, 8, 9.2, 5.1, and 4.9. The failure to reduce the infestation below about 5 grubs per animal can be accounted for by infestation from trail herds and from unworked herds in the area owned or controlled by noncooperators. During the past season there were in this area 3,170 cattle, estimated to have 45,300 grubs, which could not be worked. Results of a large number of tests, made in different localities under various conditions, indicated that infested animals could be rapidly and effectively treated with small medicated rods inserted into the grub openings in the skins of cattle. A field test was undertaken in Colorado, and about 3,000 head of cattle were successfully treated with the rods. Shortly after the 3,000 mark was reached and other cattle had also been treated, malignant edema developed in 8 head, all the cases terminating fatally. Experiments were begun at once to find some effective method of rendering the rods safe against anaerobic infection. Results of the preliminary tests indicate that colloidal iodine added to the formula prevents development of malignant edema infection.

Results of further tests on farm and range sheep indicate that pine tar and pine-tar oils do not repel the fly, *Oestrus ovis*, nor prevent it from depositing its larvae in or around the nostrils of sheep.

PARASITES OF SWINE

Further investigations on the life history of the large intestinal roundworm of pigs have shown that the embryonated eggs are not infective until the larva which is present in each viable egg has reached the first molt. At a temperature ranging between 70° and 75° F. the eggs reached the infective stage in about 4 weeks; at a temperature of 87° the eggs reached the infective stage in 18 days.

Previous difficulties in producing experimental infestation of pigs with ascarids have retarded to a great extent the study of ascariasis in swine under controlled conditions. These difficulties were overcome by feeding to pigs small numbers of eggs daily for about 12 weeks. Two sets of pigs, one maintained on a diet deficient in vitamin A and the other on a balanced diet, were used. Both groups became equally and heavily infested; during the course of this experiment incompletely grown worms were eliminated spontaneously from the digestive tract of pigs, observations in harmony with those made by another worker in this Division several years ago. The worms eliminated from the pigs on a diet deficient in vitamin A were larger than those eliminated from the pigs on an adequate diet. Since the worms in the two groups of pigs were of the same age and were passed during the same periods, it is safe to conclude that the vitamin deficiency of the pigs was favorable to the growth of the worms, a conclusion in harmony with recent work on the relation of nutrition of the host to its susceptibility to parasitism.

Continued progress has been made in tests on the control of swine kidney worms in the vicinity of Moultrie, Ga. The details of the control system have been set forth in the reports of the previous 2 years. Essentially the system is designed to protect pigs during the suckling period from the infective larvae which develop from eggs eliminated with the urine of infested sows, and to keep the pigs, after weaning, on temporary pastures and away from the sows and other hogs. In the general run of southern hogs that reach the Moultrie abattoir, about 95 percent of the livers and nearly all the kidneys and leaf lard are condemned, and from 5 to 10 percent of the loins must be sold as second-grade loins, because of the infestation with kidney worms. These losses

are in addition to unthriftness and stunting on the farm. In most sections of the South practically all sows are infested. Tests during the past year showed that by the use of simple precautions developed in connection with kidney-worm control, together with proper feeding and other sound husbandry practices, pigs are ready for market at about 6 months of age, and that the success in raising pigs free or nearly free from kidney worms depends on the degree of adherence to the sanitary principles developed by Bureau investigators. Pigs raised under the kidney-worm-control plan are not only thrifty but show comparatively few circumscribed lesions or no lesions in the liver, and the kidneys and loin muscles are free from worms. Thus, effective parasite-control measures are being developed for one of the most serious obstacles to profitable swine production in the South.

Experiments were conducted at Beltsville, Md., with the eggs and larvae of two species of nodular worms, *Oesophagostomum dentatum* and *O. longicaudum*. The larvae were found to be long-lived, fairly resistant to low temperatures, though they were killed on the ground during the unusually cold winter. The larvae survived for months outdoors under favorable conditions, especially in the presence of moisture. The eggs of the common nodular worm, *O. dentatum*, hatched 8 inches below the topsoil and the larvae migrated to the surface. The eggs and larvae of nodular worms were more resistant than those of the kidney worm, and control measures for nodular worms, therefore, must meet more rigid requirements than those found to be successful in controlling kidney worms. In a study of experimental infections of pigs with *O. dentatum*, the following points were noted: Growth of pigs was retarded to some extent; there was, in some cases, a slight elevation in body temperature; there were some significant changes in the blood. Tests involving the daily administration of iron and copper to pigs experimentally infected with this species showed that although the treated animals became infested, they gained weight more rapidly than untreated control animals harboring a much lighter infestation.

Species of earthworms which were found to be suitable intermediate hosts of the two common species of swine lungworms, *Metastrongylus elongatus* and *Choerostrongylus pudendotectus*, were found to be suitable intermediate hosts of one of the comparatively rare species of swine lungworm, *M. salmi*. Larvae of *M. elongatus* were found alive in earthworms 9 months after experimental infection. It was determined that *M. elongatus* begins to produce eggs about 1 month after experimental infection, and that the period during which eggs continue to be eliminated from infested pigs is markedly variable.

Observations in the vicinity of Moultrie have shown that the kidney-worm-control plan is effective in controlling lungworms also. These observations bear out previous work which showed that although earthworms were abundant in woods adjoining pastures and in old lots and yards, they were scarce or absent on temporary pastures.

In view of an increase in the number of reported cases of trichinosis in man, an investigation is being conducted in cooperation with the Meat Inspection Division to determine whether cooked and cured meat food products containing pork-muscle tissue and originating in establishments under Government supervision, contain viable trichinae. Several hundred samples purchased in retail establishments and elsewhere have been examined, and no evidence was found to incriminate these products as sources of human trichinosis. Samples of fresh pork from grain-fed hogs as well as samples of pork from garbage-fed hogs are being examined with a view to determining the factors responsible for the spread of trichinosis among pigs.

PARASITES OF POULTRY

NEMATODES

The nematode *Trichostrongylus tenuis* was experimentally transmitted from game birds to poultry. The chicken was infected with cultures from the Oregon mountain quail, the natural infestation in the quail constituting a new host record; the chicken, turkey, and guinea fowl were infected with cultures from the pheasant. Clinical and pathological effects followed infestation but, if reinfection was prevented, they were of short duration and the worms usually died in about 2 months. Comparative morphological studies of specimens from the European partridge and the red grouse of Great Britain and from the pheasant, blue goose, wild Canadian goose, domestic goose, guinea fowl, chicken, turkey, and bobwhite quail of the United States led to the conclusion that only

one species of *Trichostrongylus* was involved, namely, *T. tenuis*, and that *T. pergracilis* is identical with it. Results of a quantitative study of *Ornithostrongylus quadriradiatus* infestations of pigeons indicated that no age resistance nor resistance from previous infestation was developed. Grasshoppers and the common cockroach have been demonstrated as intermediate hosts of the crow stomach worm, *Microtetrameres helix*, and the pigeon was experimentally infected as a new bird host; the grasshopper, *Paroxya clavuliger*, was reported as an additional intermediate host for *Cheilospirura hamulosa*, the gizzard worm of chickens.

CESTODES

As intermediate hosts there have been discovered a ground beetle (*Celia muscula*), serving for *Railletina magninumida*, a guinea fowl cestode, and a dung beetle (*Aphodius granarius*), a rove beetle (*Oxytelus* sp.), and young grasshoppers (*Melanoplus bivittatus* ?), serving for *Hymenolepis variabilis*, a crow cestode which has related species in poultry. The proliferating larval stages of *H. cantaniana* have been studied; observations on natural infestations support those made on experimental infestations, that, of the dung beetles, *Atocnius cognatus* serves, but *Aphodius granarius* does not serve, as an intermediate host. Attempts to develop *Railletina echinobothrida* by direct feeding experiments, that is, without an intermediate host, and to infect grasshoppers, mollusks, and several coleopterans, as intermediate hosts, have been uniformly unsuccessful. The poultry tapeworm, *Hymenolepis carioca*, was reported for the first time from the California valley quail.

PROTOZOA

A description of two new species of *Eimeria* from gallinaceous game birds and a key to the species of *Eimeria* of birds have been published, as has also a new species of *Caryospora* from the turkey buzzard. Experiments to determine the value of a weak dilution of vinegar, given by mouth for coccidiosis, are being continued; it did not prove effective as a preventive of *Eimeria tenella* infection. *Trichomonas gallinarum*, isolated from an adult fowl, was pathogenic to young chicks, infestation resulting in loss of appetite, droopiness, and diarrhea; the organisms had penetrated the mucosa of the ceca. An unusually prolonged case of cecal coccidiosis was observed, with acute clinical and pathological effects almost 2½ months after a single experimental feeding of *E. tenella*, reinfection having been prevented.

MISCELLANEOUS PARASITES

NEMATODES

A continuation of studies on the influence of diets deficient in vitamin A on the development of ascarids in the dog confirmed previous findings to the effect that age resistance to infestations with *Toxocara canis* may be broken down in some cases by maintaining old dogs on a ration deficient in vitamin A. Young dogs maintained on such a ration were much more susceptible to infestations with *T. canis* and *Toxascaris leonina* than were control dogs of the same age fed a normal ration.

Facts were discovered in connection with the question whether migration of nematode larvae to the lungs is merely an incident in the course of their general migration from the skin to the alimentary canal or whether this migration is of biological significance. The larvae of *Nippostrongylus muris*, a nematode parasitic in the intestine of rats, migrated to the lungs regardless of whether they entered through the mouth or the skin. Those larvae which failed to get to the lungs did not develop to the stage adapted to survive in the intestine. The larvae of a related worm, *Longistriata* sp., parasitic in the intestine of mice, did not migrate from the intestine to the lungs; their entire development in the host took place in the intestine. When placed on the skin, however, these larvae evidently migrated through the lungs but did not become arrested there; they passed rapidly into the stomach by way of the trachea and esophagus. In experiments with the dog hookworm, *Ancylostoma caninum*, guinea pigs being used as experimental hosts, it was determined that though the larvae migrated from the intestines to the lungs, no development took place while the larvae were in the lungs; the migration of the larvae in guinea pigs can be explained on the basis that this host was an unusual one. In the normal

host, the occasional migration of the larvae from the intestine to the lungs is merely an accident and apparently of no biological significance. In experiments with the human hookworm, *Necator americanus*, guinea pigs being used as hosts, the larvae migrated from the intestine to the lungs and underwent considerable development in the lungs before returning again to the intestine.

TREMATODES

A number of life histories of flukes occurring in reptiles, amphibians, birds, and wild mammals have been completely ascertained. One fluke, *Brachylaemus virginiana*, normally a parasite of the opossum and having a land snail as an intermediate host, was found to be capable of infecting dogs, cats, and young chickens.

TREATMENT FOR INTERNAL AND EXTERNAL PARASITES

In the treatment of heart-worm infestation in dogs, tests with the drug foudain indicated that it can be given intravenously as well as intramuscularly. Intravenous administration permitted in most cases the use of a smaller total dose of the drug and resulted in a more prompt disappearance of the microfilariae from the peripheral circulation. Evidence indicated that the administration of moderate doses over a period of time resulted in a central necrosis of the liver and in an acute toxic nephrosis. However, in most dogs killed 38 days or longer after the termination of the treatment, the damage done to the liver and kidneys has been found to be adequately repaired. Blood-chemistry studies on dogs treated with the drug indicated that the liver injury caused by the drug may lead to a lowering of the blood-calcium level in the later stages of treatment. Tests conducted with neostibosan, sodium cacodylate, metaphen, and tryparsamide indicate that these drugs apparently have no effect in diminishing the number of microfilariae in the peripheral circulation.

Results of critical tests with methyl chloroform at a dose rate of 0.3 cubic centimeter per kilogram of body weight indicated that this drug possesses an aggregate efficacy of 100 percent for the removal of ascarids, and 84 percent for the removal of hookworms from dogs. In critical tests on swine, normal butyl bromide possessed a very low efficacy for the removal of ascarids from these animals.

Efforts to develop a satisfactory treatment for the removal of tapeworms from poultry were continued. Critical tests carried out with a large number of drugs showed that none of the compounds used were satisfactory for the removal of tapeworm scoleces although some removed many or all of the tapeworm proglottids.

A 5-percent mixture of orthophenylphenol in hydrated lime or kaolin dusted into the feathers of chickens was effective for the destruction of the body louse, *Menopon biseriatum*, of these birds. Pure coconut-oil soap in a dilution as low as 4 percent in water was effective for the destruction of the sucking louse, *Haematopinus suis*, of swine. Tests conducted with a 50-percent solution of acetone against the sucking louse of swine indicated that the drug in this dilution was effective in destroying all lice and about 10 percent of their eggs. Acetone in a 12.5-percent solution was apparently ineffective against these lice. Experiments in the treatment of canine sarcoptic mange with derris powder containing 5-percent rotenone gave promising results, but additional tests must be carried out before definite conclusions can be drawn as to the value of this treatment.

INDEX CATALOG AND COLLECTION

The index catalog of medical and veterinary zoology was maintained and progress made in the preparation for publication of part 2 of the author catalog. There were 1,764 accessions to the helminthological collection.

REPORT OF THE CHIEF OF THE BUREAU OF BIOLOGICAL SURVEY, 1934

UNITED STATES DEPARTMENT OF AGRICULTURE,
BUREAU OF BIOLOGICAL SURVEY,
Washington, D. C., August 31, 1934.

SIR: I present herewith the report of the Bureau of Biological Survey for the fiscal year ended June 30, 1934.¹

J. N. DARLING, *Chief.*

HON. HENRY A. WALLACE,
Secretary of Agriculture.

INTRODUCTION

REORGANIZATION OF THE BUREAU

Within the Bureau of Biological Survey are the potential agencies for promoting a national movement for wildlife restoration. The knowledge and approved methods for such public activities must be provided and services extended to all State educational institutions and conservation organizations in position to cooperate. This report presents the accomplishment in these directions during the past year.

To bring about a more complete coordination between the functions and the objectives of the Bureau, arrangements were completed at the close of the year for changes in organization, effective July 1, 1934. These involve the consolidation of the former Divisions of Game and Bird Conservation and of Predatory Animal and Rodent Control into a new Division of Game Management; the creation of a Division of Public Relations, by consolidating two sections formerly responsible directly to the chief, and the assignment to it of additional functions in special correspondence and in relations with States; the creation of a new Division of Migratory Waterfowl; and the extension of the functions of the Division of Administration.²

BUREAU PERSONNEL

The officials directing the major operations of the Bureau are as follows:

Associate Chief.....	W. C. Henderson
Technical Advisor.....	W. L. McAtee
Division of Administration.....	W. R. Dillon
Division of Public Relations.....	H. P. Sheldon
Division of Wildlife Research ²	W. B. Bell
Section of Distribution and Migration of Birds.....	F. C. Lincoln
Section of Food Habits Research.....	Clarence Cottam
Section of Fur Resources.....	F. G. Ashbrook
Section of Disease Control.....	J. E. Shillinger
Division of Migratory Waterfowl.....	J. C. Salyer
Division of Land Acquisition.....	Rudolph Dieffenbach
Division of Game Management.....	Stanley P. Young
Section of Reservations and Game Agents.....	W. E. Crouch
Section of Law Enforcement.....	F. P. Callaghan
Section of Importations and Permits.....	R. W. Williams
Section of Predator and Rodent Control.....	A. M. Day

¹ This report covers parts of two administrations of the Bureau of Biological Survey: On Mar. 1, 1934, Paul G. Redington, who had directed the work since May 9, 1927, was transferred at his own request to the Forest Service, to resume administrative work in an organization with which he had had 23 years' previous service. The present chief was appointed on Mar. 10 and assumed office on Mar. 19, 1934.

² By additional reorganization effective Sept. 22, 1934, the former research divisions were consolidated as sections of one Division of Wildlife Research.

For efficient administration the field work of the Division of Game Management will be directed through eight regions, as follows:

(1) Pacific region (headquarters), Portland, Oreg.; (2) Mountain-Plains region, Denver, Colo.; (3) Southwestern region, Phoenix, Ariz.; (4) West Central region, Winona, Minn.; (5) Southern region, Starkville, Miss.; (6) East Central region, La Fayette, Ind.; (7) South Atlantic region, Washington, D. C.; and (8) Northeastern region, Amherst, Mass.

DEATH OF FORMER CHIEF

It is fitting here to record the death on May 19, 1934, in his eightieth year, of Edward William Nelson, third chief of the Biological Survey, from December 1, 1916, to May 8, 1927, and a member of the Bureau from 1890 to the time of his retirement at the age of 74 in 1929. His administration saw the expansion of the Bureau's work on bird conservation through administration of the Migratory Bird Treaty Act, its studies of the habits and distribution of birds through the bird-banding method, and the development of cooperative work with the States in predator and rodent control, including the building up of a trained field organization. Dr. Nelson originated the movement that resulted in the passage of the Migratory Bird Conservation Act, which became law just before his retirement from the Bureau, and in the passage this year of the Migratory Bird Hunting Stamp Act. He was instrumental also in bringing about the negotiation of the treaty of 1916 with Great Britain for the protection of birds that migrate to and from Canada, and the enactment of the Alaska Game Law of 1925, which established the present Alaska Game Commission, and in inaugurating the Bureau's work for the improvement of the reindeer herds in Alaska. His broad interests in wildlife conservation and his indomitable courage in the face of physical handicaps have been an inspiration not only to his associates in the Government but also to hosts of officials and members of scientific and conservation organizations.

RETIREMENTS OF VETERAN SCIENTISTS

On July 31, 1933, two veteran scientists and authors of the Biological Survey were retired—Vernon Bailey, after 46 years' service; and Theodore Sherman Palmer, after 44 years'. Mr. Bailey's work was chiefly in mammalogy and in conducting biological surveys of major areas; Dr. Palmer's included research, game-law enforcement, and administration; for many years between 1896 and 1914 he served as assistant chief of the Bureau and part of this time as acting chief, having prepared and transmitted the annual reports for the 4 years 1898–1901.

WILDLIFE REFUGE FUNDS

In January the Secretary of Agriculture appointed the members of the President's Committee on Wild-Life Restoration, whose report, signed by its chairman, Thomas H. Beck, recommended the allocation of \$25,000,000 for the restoration of submarginal and other lands suitable for development for game, nongame, fur, and other species. The other two members of the committee were Aldo Leopold and the present Chief of the Biological Survey. The funds since made available to the Bureau total \$8,500,000, in addition to its regular annual appropriation.

In carrying on its refuge program, the Biological Survey has received valuable cooperation from the Public Works Administration, the Emergency Conservation Work organization, the Federal Emergency Relief Administration, and other agencies, and in turn the Bureau has given every possible assistance to the Government's recovery program.

Of the emergency allotments now available, \$1,000,000 is from E. C. W. funds, set aside by Executive order for the acquisition of migratory waterfowl refuges; \$1,500,000 is from funds allocated for the withdrawal of submarginal lands, to be devoted to the production of migratory waterfowl; \$3,500,000 is in drought-relief funds, to be used to purchase lands suitable for wildlife sanctuaries within drought-stricken regions; and \$2,500,000 is in P. W. A. funds, for engineering operations to restore and control water levels, to stop soil erosion, and to improve food and other environmental conditions on Federal wildlife refuges. Additional funds to the extent of \$600,000 to \$1,000,000 are

in sight for refuges, though the operation of the Migratory Bird Hunting Stamp Act of March 16, 1934, which provides for the issuance of stamps through post offices at \$1 each, to be in the possession of every person over 16 years of age who engages in the pursuit of ducks and geese, and for the expenditure by the Biological Survey of 90 percent of the revenue for the purposes of the act, the remaining 10 percent to cover administrative expenses, the printing and distribution of the stamps, and the protection of the birds.

LAND-UTILIZATION PROGRAM AND WILDLIFE

The rapid decrease of wildlife during the past half century has been hastened by the unwise appropriation of millions of acres that originally produced an abundance of game, fur bearers, and fish. Restoring these tracts is a principal objective of the national land-utilization program. This will afford a long-awaited opportunity to increase valuable forms of American wildlife through the establishment and maintenance of an extensive system of refuges. With the emergency funds available at the end of the year, surveys were completed or are under way, and acquisitions were begun on suitable tracts along the principal flight lanes and habitats of migratory wild fowl. Among areas acquired at the end of the fiscal year, or in process of acquisition, were the following:

Area :	Approximate acreage	Area :	Approximate acreage
Lake Mattamuskeet, N. C.-----	50, 000	James River, N. Dak.-----	70, 000
Beltsville, Md.-----	800	Lake Andes, S. Dak.-----	16, 000
Mud Lake, Minn.-----	50, 000	Medicine Lake, Mont.-----	15, 000
Union Slough, Iowa-----	5, 000	Turnbull Slough, Wash.-----	5, 000
Wingo Swamp, Mo.-----	15, 000	Lake Malheur, Oreg.-----	80, 000
White River, Ark.-----	49, 000	The Spalding Ranch, Calif.-----	15, 000
Des Lacs, N. Dak.-----	75, 000	Upper Mississippi River Wild-	
Mouse River, N. Dak.-----	80, 000	life and Fish Refuge.-----	1, 000

The conditions most favorable to wildlife are identical with those that reduce erosion and promote flood control and soil restoration by the conservation of water resources and the production of luxuriant growths of vegetation for food and cover. The development of the refuge system will include replanting of food plants, raising water levels by the construction of small dams and dikes, reflooding drained areas, and impounding water in the upper tributaries of waterways.

OUTSTANDING EVENTS OF THE YEAR

The following is a brief summary of the outstanding events of the year in the work of the Bureau, or having an effect upon it. Many of them are discussed in some detail under the appropriate sections of this report on wildlife research, utilization, protection, or control.

Announcement of the reorganization of the work of the Bureau, with changes in administrative personnel and the creation of new divisions, effective July 1, 1934.

Passage of legislation by the Seventy-third Congress authorizing the establishment of fish and game sanctuaries on national forests (Pub. No. 120, Mar. 10) ; providing for coordination of interdepartmental work to insure that engineering projects that might adversely affect wildlife resources are instituted only after advice has been sought from the Bureau of Biological Survey or the Bureau of Fisheries (Pub. No. 121, Mar. 10) ; and requiring that a \$1 migratory-bird hunting stamp be affixed to licenses of waterfowl hunters (Pub. No. 124, Mar. 16).

Creation of a Special Committee on Wild-Life Conservation in the House of Representatives.

Appointment of the President's Committee on Wild-Life Restoration and the publication of its recommendations.

Completion of a most exhaustive study of the waterfowl situation throughout the United States and on important Canadian breeding grounds, including an analysis of the abundance, movements, and food resources of the birds, and the collection of data on baiting and other hunting practices, as a basis for hunting regulations.

Observations of the work of Civilian Conservation Corps camps on eastern national forests, with recommendations for the conservation of food and cover plants for wildlife without detriment to the forest-improvement operations.

Investigations of conditions affecting the Roosevelt elk of the Olympic Peninsula, Wash., with recommendations to officials of the Forest Service and the State regarding herd management.

The birth of 7 calves (5 still living) in the herd of musk oxen reestablished by the Bureau in Alaska in 1930, the first births of the species in the Territory for more than a century.

Satisfactory outcome of research in California for developing selective control methods of birds injurious to agriculture and horticulture.

Announcement to fox farmers by the Farm Credit Administration that silver foxes are eligible security for loans to aid the industry, following consideration of data presented by the Biological Survey, gathered in cooperation with fox breeders and their associations.

Beginnings of expenditure of extensive allotments for emergency funds for the acquisition, development, and improvement of refuges for migratory birds.

A successful experiment in concentrating on short notice a mobile force of law-enforcement agents in an area where violations of the Migratory Bird Treaty Act were particularly flagrant, resulting in the arrest of 78 poachers and in putting an effective stop to violations.

Definite control of typhus fever in Georgia, Alabama, and Texas through the destruction of at least 7,500,000 rats in a campaign conducted for the purpose under a Civil Works Administration project in cooperation with the United States Public Health Service.

Prosecution of rodent control on nearly 5,000,000 acres of Indian-reservation and national-forest infested lands, through the employment of Civilian Conservation Corps workers.

RESEARCH ON THE STATUS AND RELATIONSHIPS OF WILDLIFE

COMPREHENSIVE STUDY OF WATERFOWL

The continuance of unfavorable waterfowl conditions led the Biological Survey to increase its efforts to collect information and make the facts public. Resulting from extended investigations, continued from previous years, but amplified and intensified, the data gathered constituted the most exhaustive report on the current conditions of migratory waterfowl ever compiled. Maps were prepared from data collected in the field to show the principal breeding ranges and the regions of sport shooting of 24 of the most highly prized species of waterfowl and to portray the parts of the normal breeding ranges that had been rendered practically unproductive by shortage of water, food, and cover. These maps, accompanied by explanatory data, have been prepared for distribution as a printed document. (Misc. Pub. No. 210.)

This year's drought is the culmination of reduced rainfall prevailing since 1915 over a large part of the waterfowl-breeding grounds of the Northwestern States and the southern parts of the Prairie Provinces of Canada. Reports by the United States Weather Bureau and the Meteorological Service of the Dominion of Canada indicate that it is the longest continued, covers the greatest area, and is the most severe in the known history of the two countries. Combined with encroachments on breeding grounds by agriculture and drainage operations, and shooting by increased numbers of well-equipped hunters provided with transportation facilities that enable them to reach quickly the favorite hunting grounds, it has caused alarming losses of waterfowl.

A close check was kept by representatives of the Bureau in Canada and the United States, and by a large number of cooperative observers, on the outcome of the breeding seasons of 1933 and 1934, and a special study was made during the open season of 1933 of baiting, a practice that has accentuated the seriousness of the waterfowl problem. Experienced representatives of the Survey were sent to the more important nesting regions during the breeding season, and intensive investigations will be continued next fall and winter.

The results of all these investigations have shown conclusively an appalling shortage of waterfowl, a particularly serious plight of certain important species, and the necessity for taking immediate steps to save an adequate breeding stock. These reports have been widely commented upon by the daily press and outdoor periodicals, and have provided a basis of scientific fact for waterfowl-hunting regulations.

BANDING GAME AND OTHER BIRDS

Study of migratory and other birds by the banding method continues to demonstrate its value in obtaining authentic information and its popularity among both sportsmen and nature students. Banding stations are now operated at various points throughout the United States and Canada by 1,874 cooperators. These stations, selected with care, cover as adequately as is now possible the important migration routes of the various species. Technical workers are cooperating in increasing numbers, and State universities, agricultural colleges, and other scientific and educational institutions are actively engaging in this means of research.

Birds reported as banded during the year totaled about 364,000, an increase of more than 100,000 over last year. Banded birds recovered at various points numbered more than 18,000, an increase of nearly 2,000. The critical waterfowl situation, and the necessity for obtaining reliable information regarding flight routes between breeding and wintering grounds, stimulated special work at waterfowl-banding stations, at 50 of which 40,534 ducks and geese of 26 species were banded. These represented all the important game species and registered an increase of about 25 percent over last year. For the first time the mallard dropped to second place among the birds banded, the number being 9,424, as against 14,290 pintails, probably the result of several stations having deliberately concentrated on the latter. Return records for banded ducks and geese totaled 5,775.

A report, based partly on bird-banding studies, was published under the title "Restocking of Marshes with Hand-reared Mallards not Proved Practicable" in the Yearbook of Agriculture, 1934 (pp. 310-313).

RESEARCH ON BIG-GAME MAMMALS

OLYMPIC AND OTHER ELK

At the request of the Forest Service, and with the active cooperation of the State Game Commission of Washington, a study was made of the Roosevelt elk, of conditions affecting these animals on the Olympic Peninsula, and of the elk herds on the Snoqualmie National Forest. On the Olympic Peninsula a close season on the elk had been maintained for many years, up to the fall of 1933, when a short open season was allowed, State officials being of the opinion that some hunting would be beneficial in areas of overpopulation. The diversity of opinion regarding this action made it desirable to study the numbers of the elk in various localities on the peninsula, their distribution in relation to the available food supply, and the economic and ecological effects of their grazing and browsing. A representative of the Biological Survey who has had extended experience in studying elk problems made the investigations, and his report indicated the desirability of a short open season during the fall of 1934, with proper limitations as to the number of elk to be taken in the various localities, and careful supervision of hunting. His recommendations were submitted to the State game officials for their use in fixing the hunting season and prescribing hunting and management practices. On the Snoqualmie National Forest attention was given to the numbers of elk present and their relationship to the Rattlesnake Game Preserve. Sound and silent motion pictures were prepared, depicting the life history and habits of the elk of the Jackson Hole region.

MOUNTAIN-SHEEP CROSS-BREEDING EXPERIMENTS

The results were observed of crossbreeding experiments between the Dall mountain sheep and domestic sheep of Merino strain, conducted in cooperation with the Alaska College of Agriculture and School of Mines. The herd consists of 1 mountain-sheep ram, 6 domestic ewes, 3 crossbred yearlings, and 4 crossbred lambs born during the spring of 1934. The coat of the crossbred animals is largely composed of wool, with an admixture of hair, and the animals have larger frames than either the mountain sheep or the domestic sheep. In the course of summer grazing it was observed that the mountain sheep and the crossbred animals were not bothered by gnats and mosquitoes. The domestic sheep were troubled by attacks about the eyes, which often result in blindness. The crossbred animals appear to be hardy and well adapted to conditions in Alaska, and to indicate the definite value of developing a type of sheep

sued to production under the rigorous conditions there. Breeding was prevented until the middle of November, so that the lambs would be dropped in April and May, the gestation period being approximately 150 days.

RESEARCH ON FOREST WILDLIFE

Good progress was made during the year in studying the relationships of wildlife to forestry, grazing, and other land use, and recommendations and plans were prepared relating to management practices.

INFLUENCE OF MICE ON FOREST REPRODUCTION

Investigations in the southern Appalachian region were made of the relationship of logging practices and slash disposal to the rodent population, and their effect on the reseedling of these areas to valuable timber types. An abnormal increase in the number of mice was due in part to the protection that slash afforded them from their natural enemies and to the availability of food in the presence of slash on the ground. Under such circumstances natural forest reproduction was found to be greatly reduced or totally lacking.

Investigation of damage to nursery stock on the Bent Creek Experimental Forest, near Asheville, N. C., revealed the presence of the harvest mouse for the first time. Smallest of the native mice of the region and normally considered harmless, it here proved surprisingly destructive to a bed of mountain pines, from each of which it had completely stripped the outer bark and cambium from the ground to the top.

Not until this year has any damage been noted from pine mice in this mountainous region, but late in winter one check area was found where all the pine seedlings had been killed by their roots being eaten off. Though the pine mice, when present in large numbers, are a potential menace to nurseries and gardens, they will probably not prove a serious problem on timberland except under radically modified conditions.

In the Southwestern States studies were made of the relationship of deer mice and meadow mice to stands of Douglas fir. In a heavily cut-over area twice as many deer mice and 23 times as many meadow mice were taken as in a nearby stand of Douglas fir. The rodents were much less abundant in thick stands of aspen, ponderosa pine, and oak than in open cut-over areas.

ROLE OF PREDATORS IN SUPPRESSING FOREST RODENTS

On the Bent Creek Experimental Forest a study of the fall and winter feeding habits of the gray fox shows rather conclusively that it lives almost entirely on mice, rabbits, and such fleshy fruits as persimmons and wild grapes. In only a few cases were bird remains found. The growing scarcity of birds of prey may make the gray fox increasingly important in rodent control. Studies of the relationship to predators of game-bird populations also have been continued.

BEAVER AND DEER TRANSPLANTINGS

Beavers have continued to increase where planted on forest lands in the vicinity of Asheville, N. C., where during the winter it was estimated that there were approximately 20 of these valuable fur bearers on one small lake. As there is an insufficient food supply available to support this number very long, plans were made for transplanting some to establish colonies on State and Federal game refuges in the southern Appalachian Mountains. Early in January, four were trapped and liberated on a lake in the Cherokee National Forest, near Blairsville, Ga., where they have adapted themselves satisfactorily to their new environment.

Deer studies on forests have been largely concerned with a survey of overabundance and means of reducing the surplus by trapping and distribution to other refuges. Through local cooperation, traps were constructed into which deer were successfully driven and crated for shipment with relatively little injury or loss. Over a period of several months during late winter, approximately 200 were thus captured in North Carolina forests and distributed to forested areas elsewhere.

A study was also made of conditions in the San Francisco Mountain Game Preserve, Arizona, where deer were found to be moderately abundant. Although

they do not yet threaten damage to ponderosa pine or other of their natural food plants, a system of rotating deer refuges seems desirable for northern Arizona.

SNOWSHOE RABBITS AND REFORESTATION

In a study of snowshoe rabbits and their relationship to forest reproduction on cut-over lands in the Lakes States region it was found that rabbits periodically damage plantations through their destruction of pine and spruce seedlings, by eating off the terminal and lateral branches. When the rabbit population is at a low ebb, however, little damage is noticeable. Most of it is in or near areas of dense low cover. Control by altering present silvicultural practices or reducing the numbers of rabbits is desirable only during the peak periods of rabbit abundance and then only on and adjacent to plantations planted or ready for planting.

Attention in the Lakes States region also has been given to planning wildlife management practices adapted to forestry conditions. This includes the taking of game censuses, introducing game animals where advisable, planting suitable game foods, and supervised removal of predators and other animals injurious to the forest trees and to valuable animal life.

STUDIES OF OTHER FOREST WILDLIFE

Field studies of the life history of wood rats in Arizona were virtually completed during the year, and additional work was done on the relationship of jack rabbits to the stand of grass and other grazing plants. A detailed study was also made of the abundance of rodents covering a strip 20 to 30 feet wide and 56 miles long on the Santa Rita Range Reserve, Ariz., to provide a better understanding of rodent distribution especially as related to vegetation and soils. Two small field laboratories were constructed with P. W. A. funds. Through cooperation with the University of Arizona, assistance was rendered in upland game studies; and through cooperation with the Soil Erosion Service of the Department of the Interior the relationship of rodents to livestock grazing and soil erosion on the Navajo and Hopi Indian Reservations was studied. Assistance also was given on submarginal land problems in cooperation with a committee on wildlife relationships of the University of Arizona, and maps were prepared indicating areas that might be suitable for wildlife development. Similar studies also were made on the public domain and on private lands adjacent to national forests and Indian reservations.

INFLUENCE OF C. C. C. ACTIVITIES ON WILDLIFE

At the request of the Forest Service a biologist made a detailed inspection of the cultural work of the Civilian Conservation Corps camps on national forests in the southern Appalachian Mountain region, from northern Virginia south into Alabama. He visited camps on each forest, and studied the work from the viewpoint of its effect on wildlife. Recommendations were made to the Forest Service on means by which the operations might be improved in the interest of wildlife without detriment to the forest-improvement work. Similar work also was done in the Allegheny National Forest in Pennsylvania. In the Yearbook of Agriculture, 1934, an article was published (pp. 373-376) on Wild Life Factors Important in Efforts to Improve Forests.

IMPROVEMENT OF REINDEER INDUSTRY IN ALASKA

The substation at Nome of the reindeer experiment station was closed early in the year because of reduced appropriations, and it was not possible to undertake further field studies of reindeer-caribou crossbreeding experiments on Nunivak Island. About 75 caribou, including 5 particularly large bulls and about 25 fawns, were trapped last spring in one of the fenced pastures during an unprecedented migration through the immediate section about the reindeer experiment station at College, to be used in crossbreeding experiments with reindeer.

MUSK-OX INVESTIGATIONS

The most notable event in the herd of musk oxen since their introduction into Alaska in 1930 was the first calving of the animals at the reindeer experiment station. Two calves were born on April 29; 2 on May 1 (1 weighing 24½

pounds being still-born); the fifth on May 10, the sixth on June 8, and the seventh on or about June 24. The calves were subject to attack by the older animals, particularly the bulls, and the last calf born, weighing 17 pounds, died of injuries thus received. Of the 9 cows, now 5 years old, 7 gave birth to calves. There are in addition 4 cows now 4 years old that did not breed.

Effective patrol to protect the musk oxen from predatory animals proved particularly difficult owing to the dense brushy thickets on the pasture. Eight black bears and one black wolf were killed, and during the spring several men were employed in clearing out brush about the enclosure to facilitate patrol.

During the shedding period 24 pounds of musk-ox wool was collected and turned over to the extension service of the College of Agriculture and School of Mines for weaving experiments, and many scarfs that sold at \$10 each were woven by girl students. Further experiments are being conducted in weaving such articles as mittens, socks, and baby clothes. Previous studies by textile experts have shown that the wool compares favorably with cashmere and vicuna, and holds considerable promise for successful development in the making of garments that are exceptionally light, soft, and warm.

Of the 34 musk oxen introduced 4 years ago, 24 survive. There are now 13 cows of breeding age in the herd, 11 bulls, and the 5 calves, and steady increase is anticipated.

SCIENTIFIC REFERENCE COLLECTIONS AND RECORDS

Consistent progress was made in assembling and recording scientific information based on collections of specimens and data obtained regarding the life history, habits, and distribution of mammals and birds. Many investigators, including a number from foreign countries, utilize the laboratories and the record files at Washington. During the fiscal year 489 mammal specimens were identified for 41 institutions and individuals in 18 States; loans of 170 specimens were made to 9 institutions and individuals in 7 States and 1 foreign country; and 627 mammal specimens were borrowed for use of specialists from 9 institutions in 6 States and 1 foreign country. The number of mammal specimens received for permanent deposit in the Biological Survey collection was 636, nearly twice the number received last year.

Activity in describing new forms of mammals has been particularly pronounced during the year. In articles published in various journals by the staff of the Biological Survey, 64 were described as new. New type specimens of mammals added to the Biological Survey collection numbered 53, belonging to the following genera: *Felis*, 2; *Thomomys*, 24; *Oratogeomys*, 15; *Orthogeomys*, 1; *Perognathus*, 2; *Dipodomys*, 5; *Sigmodon*, 2; and *Neotoma*, 2. The number of type specimens of mammals now in the Biological Survey collection is 907. A total of 4,400 mammal records were added to the card information files.

During the year 1,632 bird specimens were added to the collection, chiefly from North Carolina and Georgia. The number of new card records for the year totals 27,615, making the grand total more than 1,954,000 card records on the distribution and migration of birds, exclusive of data in the bird-banding files. These carded records include invaluable data gathered over a period of nearly half a century, and are made readily available in this form for the use of scientific investigators throughout the country as well as members of the Survey staff. Assistance given other scientific and administrative organizations included identifications of 734 birds for museums, educational institutions, and other organizations; assistance also was given cooperators engaged in preparing publications on the birds of the following States: Louisiana, Iowa, Missouri, Indiana, Virginia, Washington, Utah, North Carolina, Oregon, and Nevada; and 403 birds were loaned to specialists making studies of particular groups or regions. Much work has also been done in keeping the taxonomic classification of the collection of specimens up to date, and in conformity with revisions of the various groups.

A comprehensive article on the research work of the Biological Survey and a historical account of the Bureau's work was prepared under the direction of the Chief, and published with illustrations in the October 1933 issue of the Scientific Monthly; and a short chapter on the same subject was published in a general account of the history and functions of the Department, in Miscellaneous Publication No. 88, revised.

During the year a report on Cave Life in Kentucky, prepared in the Biological Survey in cooperation with the Kentucky State Geological Survey, was pub-

lished by the University Press, Notre Dame, Ind., reprinted from the American Midland Naturalist, to which the Bureau submitted it for publication in May 1933.

ECONOMIC STUDIES OF WILDLIFE

WILD-FOWL FOOD RESOURCES

The shortage of eelgrass on the Atlantic seaboard and the consequent abrupt decrease in numbers of eastern-coast sea brant have engaged the attention of the Biological Survey for several years. While in some places the eelgrass is in a more serious condition than last year, it seems to show noticeable improvement in a number of sections and a slight improvement over the major part of its range in the United States. Some areas, however, that formerly supported a dense growth of the plant are now almost completely denuded. In general, the best improvement is noted in areas of reduced salinity. The less technical aspects of this 3-year study are presented in an article in the Yearbook of Agriculture, 1934 (pp. 191-193), *Eelgrass Disappearance Has Serious Effects on Waterfowl and Industry*.

Starvation of waterfowl on the Atlantic coast was the subject of an investigation during February. Because of an unusually severe and extended period of cold and heavy freezes, it became necessary, in cooperation with State officials, to undertake extensive feeding of waterfowl on Chesapeake Bay and the Potomac River in Maryland and Virginia. Feeding also was done in other sections of the Northeastern States.

Waterfowl food-resource surveys were made of most of the lakes in northwestern Iowa, in coastal regions of Texas, and in parts of Oregon and Washington. Experimental waterfowl-food plantings also were made in some of the fresh-water lakes and streams of the two States last named. The effect of drought upon waterfowl-food conditions was studied in Minnesota, Iowa, Illinois, North Dakota, South Dakota, and Montana. It was urgently recommended that water be impounded where possible.

Proposed bird-refuge areas in Virginia, North Carolina, South Carolina, New Mexico, Arizona, and Oregon were surveyed as to biological suitability for acquisition. Investigations and recommendations were made for the improvement of wild-fowl food resources on various Federal bird refuges in Maryland, North Carolina, Florida, Nebraska, Utah, and California, and similar cooperative investigations were made of lakes on State refuges in Virginia and North Carolina.

A survey was made of the present wildlife population, food resources, and probable effects of the creation of a proposed fresh-water lake of that part of Great Salt Lake, Utah, east of Antelope Island. The project was not recommended because of the inadequate and unstable water supply and the apparent probability that a serious outbreak of botulism, or western duck sickness, might result.

Field studies were made of the relation of mosquito-control operations to waterfowl food plants in a number of marsh areas of the East. It is apparent that serious injury is being done to wildlife through mosquito-control work.

A survey of waterfowl conditions and of baiting and other gunning practices undertaken at the request of the advisory board, Migratory Bird Treaty Act, occupied the attention of Bureau specialists for periods varying from 1 to 3 months. Practically every important gunning section was investigated. Notes on the abundance, distribution, and availability of waterfowl-food plants during the fall and winter were made and many data obtained on the present status of ducks and geese from the viewpoint of distribution, number, sex ratio, proportion of young to adults, and gunning practices. The report of this study, which was summarized for the board in a 17-page mimeographed circular, concluded that baiting as now practiced is not a conservation measure, but is employed in order to increase the kill of waterfowl. Most species have shown a noticeable decrease during the past 5 years.

FIELD INVESTIGATIONS OF INJURIOUS BIRDS

Studies in control methods and research on crop depredations by birds in California were continued, and special assistance was furnished by the State department of agriculture and county agricultural commissioners in coping with attacks by horned larks on beans and other vegetable crops, crows on sugar

beets and almonds, and linnets on figs and other fruit crops. In the case of blackbird damage to rice, cooperation was received not only from county officials as noted above but also from rice growers' associations. The policy of the Bureau in this type of work, the need for which recurs annually, and a summary of the effects of the control methods recommended, are embodied in an article prepared for the Yearbook of Agriculture, 1934, and published under the title "Bird Species Not Menaced by Local Control Campaigns" (pp. 149-152).

Depredations on crops by migratory wild fowl are found to be serious in certain localities. Investigations were made in Colorado, Nebraska, Oklahoma, Texas, New Mexico, California, Washington, and Oregon. Most of the damage was done to grain, though young hay crops were seriously injured in a few localities in Washington and Oregon. In Texas and New Mexico the sandhill crane, rather than waterfowl, appeared to be the chief offender.

An investigation was begun to determine the biological relationship between predators, rodents, and quail on a Virginia game farm, and an annoying diurnal roosting of turkey vultures in the vicinity of Washington, D. C., was investigated and recommendation made for its removal.

During May and June field investigations of crows in relation to nesting waterfowl were conducted in the Canadian prairie section, in the North Central States, and in Colorado. The most extensive of these concerned a single lake in the Canadian breeding area of Saskatchewan, where the damage by crows was found to be serious. Further investigations are planned, to learn the destructiveness under average conditions. Only slight damage by crows was discovered in the North Central States, and practically none by either crows or magpies was noted in the Colorado area. Because of the severity of the drought, however, the two areas last named supported few ducks or crows, so that the findings there were probably not representative of normal years.

An investigation of the Upper Mississippi River Wildlife and Fish Refuge and the Lake Erie marshes of Ohio showed that skunks, crows, and brown rats were somewhat destructive to nesting waterfowl.

LABORATORY WORK IN FOOD HABITS OF WILDLIFE

A large part of the laboratory study of food habits of wildlife was carried on for States, institutions, or individuals. Workers in the Washington office examined 853 bird stomachs, 979 hawk and owl pellets, 10 lots of miscellaneous bird-food items, 517 mammal stomachs, and the feces of 1 amphibian and 3 reptiles. In the food habits research laboratory at Denver, Colo., the stomachs of 2,816 mammals were examined—2,735 coyotes, 37 bobcats, 23 bears, 15 armadillos, 3 mountain lions, 2 raccoons, and 1 fox.

The project on the food habits and economic relationships of the fish-eating birds has been materially advanced; the stomachs of 77 ruffed grouse were examined; and a technical bulletin on the crested myna was prepared for publication. A report on some early summer food preferences of the American raven in southeastern Oregon was published in an ornithological journal.

In cooperation with the southwestern quail investigation, analyses were made of the stomach contents of 55 Gambel's quail. For the cooperative project on the bobwhite in Wisconsin, 591 pellets of the great horned owl were examined. For the New England grouse investigation, the stomachs of 218 ruffed grouse and a series of raptors were studied, and the findings were published in a mimeographed leaflet (Bi-1297), Winter Food of the Ruffed Grouse in the Northeast. Mammal-stomach examinations to the number of 421 were made for Bureau investigators, 37 additional fox stomachs were studied in the cooperative project with the Virginia Commission of Game and Inland Fisheries, and a study of the food habits of Connecticut fur bearers was initiated in cooperation with the State superintendent of fish and game. Many special examinations also were made for universities, other institutions, and individuals.

All stomachs of diving ducks in the Survey collection have been examined, thus completing the laboratory work for a final report on the food habits of these birds.

A report prepared for the American Society of Mammalogists, entitled "Autumn Food Habits of Coyotes, A Report of Progress, 1932", was published in that society's journal in August, and was followed by a paper read at the society's annual meeting on the Winter Food Habits of Coyotes, A Report of Progress, 1933. These present a summary of the findings thus far obtained.

There were accessioned during the year 4,807 mammal stomachs, chiefly predators, and additions were made to the reference collections as convenience

permitted or necessity required. Duplicate sets of part of the mammalian-hair slide collection were prepared, one for deposit in the Washington laboratory, and a series of drawings of mammalian hairs is being made for reference.

As part of an economic study made in connection with waterfowl investigations and white-necked raven depredations, 572 bird stomachs were analyzed in the Denver laboratory, and specimens of seeds and plants were collected and identified in the field work on waterfowl food and cover plants.

The reference collections, so essential in all branches of food-habits investigations, were improved and added to during the year. The seed collection now contains 6,616 specimens of 4,553 species, representing 1,345 genera of plants most frequently taken as bird food. Additional drawings were prepared for a projected manual on wild-fowl foods, and many additions were made to the photographic file of native cold-blooded vertebrates, available for educational purposes and for use in connection with proposed food-habits studies.

The most tangible results of laboratory work on food habits, as always, are publications revised or newly issued. Two manifold leaflets for use in answering correspondence, *Publications on Cage Birds* (Bi-173) and *Dealers in Cage Birds and Cage-Bird Supplies* (Bi-631), have been revised; and two more, *Planting for Wildlife in the Corn Belt* (Bi-1326) and *Planting for Wildlife in the Cotton Belt* (Bi-1327), were issued. The two last mentioned, together with *Farmers' Bulletin No. 1719, Improving the Farm Environment for Wild Life*, are of special value both to farmers who have agreed to withdraw land from growing competitive cash crops and to those living on land that is more or less submarginal. *Winter Feeding of Wild Life on Northern Farms*, issued in the *Miscellaneous Publication series* (no. 159), is a comprehensive treatment of the problem of providing wild birds and mammals, especially game species, with an adequate and reliable supply of food. A leaflet (96-L), much needed to facilitate answering correspondence, *Protecting Poultry from Predacious Birds*, was published during the year.

FIELD STUDIES OF THE FOOD OF MAMMALS

In continuing detailed studies of the food and other habits of the Texas armadillo, investigations were conducted in the field, and careful laboratory examinations are being made of the stomachs collected. Laboratory feeding experiments have also been combined with field experimentation to determine the relation of the armadillo to nesting quail and their eggs. The investigation shows that the armadillo is largely insectivorous and only in a slight degree or under unusual circumstances seriously detrimental to agriculture. Some field work was also done by one investigator on the food habits of predatory mammals. In the Pacific Coast States further studies were made of pocket gophers and other rodents.

RESEARCH ON FOOD HABITS OF FOREST WILDLIFE

A report on an investigation of the relation of vertebrate animals to the white pine weevil in New England has been prepared for publication, completing the work on this forest-fauna project. Studies in New England on the relation of forest wildlife to forest management were continued. Forest-game management studies are being made in New Hampshire from headquarters in the Pillsbury State Forest. Wildlife and other biological investigations were made also in the Bartlett Experiment Forest, in New Hampshire; and in the Chenango Experimental Forest, in New York.

UPLAND-GAME STUDIES

At the request of the Soil Erosion Service, surveys and recommendations were made for improving the environment for wildlife on areas in Wisconsin and New Mexico. On the New Mexico area (the Navajo Indian Reservation) it was found that excessive grazing was very destructive to the wildlife of the area. Investigations and recommendations also were made at C. C. C. camps in Maryland regarding upland-game-bird areas.

Of the series of experimental upland-game-bird management projects in which the Survey has cooperated, the Arnett project in Oklahoma has been canceled by the State game and fish department. Because of the unusual importance of this particular area, however, in the opportunity it affords for

prairie-chicken studies, cooperative funds have been provided to continue the work, and the Survey will continue to serve as a cooperator. Six other cooperative projects—2 in Arkansas, and 1 each in Oklahoma, Indiana, North Carolina, and South Carolina—are being continued, and much valuable information is thus being obtained on game management.

RESEARCH IN FUR PRODUCTION

IMPORTANCE OF FUR AS A NATURAL RESOURCE

With few exceptions the States reporting show a decided decrease in the 1933 catch as compared with that of 1932, even though the prices paid for raw furs had increased slightly at the close of the 1932 season. When the fur trade regains its normal condition it will probably face so marked a shortage of American raw furs that the increased prices will send every country boy to the village for more and more traps. The natural result may be a period not of scarcity of furs but of actual lack. The Biological Survey has continued to cooperate with State game commissions, raw-fur dealers' associations, and others in keeping before the public the necessity of obtaining records of the annual catch in the various States. Unfortunately few fur laws require such reports, and not until all States have legislated on the subject can estimates be made of the catch throughout the country.

The conservation of fur resources is of exceptional importance to the United States, not only because of the potential financial returns to trappers but also because of the employment of people in the fur business. At his request the Bureau sent to the Chairman of the Special Committee of the House of Representatives on Conservation of Wild Life Resources a detailed report on the importance of conserving fur as a natural resource. Through the cooperation of agencies interested in wildlife conservation, the Bureau hopes to be instrumental in restoring at least part of this wasted heritage.

Since a considerable part of the original range of fur animals is now under cultivation, it would be both unwise and impossible to restore all the species to all their former haunts. Crop and livestock production has contributed extensively to decreasing the natural supply of fur animals. These could be introduced into extensive areas unprofitable for agriculture, however, for their presence not only would enrich the forests and parks with interesting species but economically would add to the decreasing supply of valuable fur. Intelligently managed, a project for restocking beavers, for instance, has tremendous possibilities for increased fur production.

To pursue the restoration of beavers and other fur animals successfully it is necessary to establish definite and practical policies of management. To this end the Bureau of Biological Survey is effecting a closer cooperation with the Forest Service, the National Park Service, and State game commissions. The Bureau has continued the compilation of such data as are available on the numbers of fur animals taken in the various States; it has projected investigations to increase our knowledge of the present status of the more important species; and during the year it issued a mimeographed abstract of State laws on trapping seasons.

FOX FARMERS AIDED BY FARM CREDIT DECISION

The announcement by the Farm Credit Administration that silver foxes are eligible security for loans, even though it came rather late in the season, was encouraging news to fox farmers, many of whom had faced difficulty in carrying their animals through the winter and in financing the production of the next season's crop of pelts. This action was in part based on data prepared by the Bureau in cooperation with breeders and associations representing the silver-fox industry. It has been effective in placing fur farming in a more stable position in the general agricultural field.

In times of stress persons engaged in agriculture and related industries especially need guidance and cooperation from the Federal Government. The demands for information on fur production have thus been unusually great during the past 3 years, and as much as possible has been accomplished with the limited personnel and funds available.

FUR ANIMAL EXPERIMENT STATION INVESTIGATIONS

PRODUCTION-COST STUDIES

Improved types of pens, dens, and feeding equipment have been investigated at the fur animal experiment station at Saratoga Springs, N. Y., in order to obtain information as to the extent of overhead charges and as to measures of economy in labor and feed costs. Accurate records are kept of food consumption and feeding costs for foxes, fishers, martens, minks, and raccoons.

Experiments to determine more economical and efficient methods of feeding foxes were continued. Two years' study of the value of dehydrated beef meal as a cheaper substitute for 75 percent of the raw meat in the ration has been completed. No appreciable difference was evident in the health, breeding performance, or quality of fur produced by foxes receiving the various rations. Though the pups given the raw meat showed slightly better growth than those fed partly on the beef meal, the advantage was offset by the difference in feeding costs. During the first year the saving thus obtained on each pelt produced was approximately 40 percent, calculated on the basis of the pup increase obtained by the vixens on the two diets.

In similar experiments with martens and minks no apparent difference was evident in appetite or health or in general condition of the fur.

STUDIES IN COLOR INHERITANCE

New data obtained from breeding experiments in color inheritance of foxes have tended to strengthen the theory that the inheritance of red, cross, and black color patterns is controlled by two Mendelian factors. Modifying factors are involved, however, that cause variations in the relative extension of the red and black color in the cross-fox phenotype. Four pairs of purebred Alaskan black pups and one pair of adult standard silver foxes were recently purchased for use in further studies to determine the genetic basis of silvering and the relationships between the various degrees of silvering, and also to evolve methods of breeding that will insure control of gradations.

MARTEN-BREEDING EXPERIMENTS

A third generation of pen-raised martens was born in April at the fur animal experiment station, where the first authentic record was made of pen-raised martens producing and raising a litter in captivity. The marten-breeding experiments have not only established the fact that breeding is in July and August and that the gestation period is between $7\frac{3}{4}$ and $9\frac{1}{2}$ months, but they have demonstrated in three instances that litters are produced consecutively.

STUDIES AT THE RABBIT EXPERIMENT STATION

EXPERIMENTS IN FEEDING YOUNG RABBITS

There is a potential market of several million dollars in rabbit skins in the United States, now largely supplied by foreign countries.

A series of experiments was partially completed at the United States rabbit experiment station, at Fontana, Calif., in the feeding cost of developing domestic rabbits from weaning age (8 weeks) to 6 pounds in weight on 13 different rations. A summary of the completed groups was presented by a Bureau representative before the national convention of the American Rabbit and Cavy Breeders Associations at Chicago, and was later issued as a mimeographed leaflet (Bi-1304), *Feed Requirements in Raising Rabbits to a Weight of 6 Pounds*. This summary of experiments with 263 animals (all New Zealands), the individual weights of which were recorded weekly, showed that it required 6.83 pounds of feed, 60 percent of it alfalfa hay, to produce 1 pound of gain in live weight between weaning age and a weight of 6 pounds. This is in contrast to the requirement for does and young of only 5.83 pounds of feed to produce 1 pound of live weight up to weaning age. A summary of this latter experiment was presented in a mimeographed leaflet (Bi-1294), *Feed Costs of Producing Young Rabbits to Weaning Age*, issued during the first part of the year. A new Farmers' Bulletin No. 1730, *Rabbit Production*, was in press at the close of the year, and there was issued as a mimeographed leaflet (Bi-1317), *A Feeding Schedule for Rabbits*.

A new experiment initiated during the year designed to test the desirability of weaning rabbits at 5, 6, or 7 weeks of age instead of at 8 weeks, which is the usual practice. An article was prepared on Rabbit-raising Profits Materially Influenced by Age at Marketing, and published in the Yearbook of Agriculture, 1934 (pp. 305-306).

Accurate production records enabled the United States rabbit experiment station to record a doe that produced 106 pounds of 8-week-old rabbits in 1 year. The progeny of this doe have been reserved for intensive close breeding. A homogeneous strain of this kind should materially enhance the experimental work through the elimination of many of the variable types.

Both cottonseed meal and sesame meal have been included in an experiment testing the relative value of protein supplements in feeding rabbits. Another experiment has for its purpose the study of the effects of supplying the feed in pellet form as a means of controlling the so-called "bloat", which has caused heavy losses in rabbits on the west coast. A mimeographed leaflet (Bi-1286), Observations on So-called "Bloat" in Rabbits, was issued during the year.

OTHER STUDIES AT THE RABBIT STATION

The station is now well equipped with all-metal hutches so made that individual feeding records can be kept on each doe and her litter. An all-metal nest box has also been designed. Metal construction greatly improves the sanitary conditions in the rabbitry. The other lines of investigation at the station are being continued. A mimeographed leaflet (Bi-1292), Pertinent Facts on the Angora Wool Rabbit, was issued during the year.

STUDIES OF FACTORS INFLUENCING THE PRODUCTION OF PRIME SKINS

Through the cooperation of raw-fur dealers the rabbit skins produced at the station were graded according to the purpose for which they could be used and are now being carefully studied through the cooperation of the Technical Association of the Fur Industry. Further detailed studies will be made after dressing and dyeing. Though nothing definite can be reported at this time as to the factors influencing the production of prime rabbit skins, indications are that in order of importance these factors are (1) heredity, (2) season in which skin is produced, (3) age of rabbit when skin was taken, and (4) kind of feed supplied. Definite information along these lines is of importance not only to the rabbit breeders but also to the fur trade.

MUSKRAT INVESTIGATIONS

During the year the muskrat investigation work was moved from Church Creek to the Blackwater Migratory Bird Refuge, both in Dorchester County, Md., and at the new site all-metal breeding pens were constructed. The experiments have demonstrated that at the prices now prevailing it is not profitable to undertake the production of these animals in small enclosures, as the investment in equipment, feed, and labor is greater than can be realized from the sale of pelts.

Information on the breeding habits of muskrats, however, can be obtained only by confining the animals in pens, so that conditions can be rigidly controlled. Research on the subject was well under way when unfortunately a hurricane devastated the entire area, drowning practically all of the animals. Since the muskrat is the most important American fur animal, there is pressing need for gathering fundamental information on the length of the gestation period, the number of litters produced each year, the number of young per litter, and the possibilities of improvement in the quality and density of fur by stocking after selective matings.

The appointment of the supervisor of the fur station on the Blackwater Refuge was terminated at the close of the year. This work had been financed cooperatively by the University of Maryland, the Conservation Department of Maryland, and the Bureau of Biological Survey. During the past year the Bureau financed the project alone, but reductions in appropriations made its discontinuance necessary. On the basis of the work undertaken, however, two extensive reports on muskrat production in captivity and in the wild have been prepared for publication.

The results of the past year's work on muskrats show that pelts trapped late in winter and early in spring are at the apex of condition and that from

this time on their value deteriorates. This prime period will vary slightly, depending on the place of trapping. These findings are exceedingly valuable to State officials responsible for formulating fur laws, for it furnishes them basic and conclusive information on which to recommend or prescribe the open seasons for trapping. Giving due consideration to primeness of fur and to breeding seasons not only aids in conserving the fur supply but also increases the value of the pelts taken. A revised edition of a mimeographed leaflet (Bi-1060), Raising Muskrats, was issued during the year.

Muskrat farmers in Delaware having raised serious objections to the drainage of adjacent marsh areas in mosquito-control operations, the executive officer of the Mosquito Control Commission appealed to the Bureau for cooperation in making investigations concerning the effect of drainage on the muskrats' food supply. Representatives of the Bureau visited Lewes, Del., and arranged to conduct necessary experimental work. Areas definitely surveyed have been set aside on which the water levels can be fluctuated at certain seasons of the year, and careful observations and records are being made as to the effect of the changes on muskrat food. Practically all the aquatic plants on which muskrats feed have been identified in these experimental areas, and several plantings of cattails have been made. Drainage operations affecting areas suitable for muskrat production were temporarily suspended pending a report on the muskrat-food investigations.

COOPERATIVE STUDIES

ESTIMATING PRIMENESS OF PELTS

That the existing methods of estimating primeness of fur are not dependable has long been recognized by the Bureau, and lack of exact knowledge on the subject has been largely responsible for the great quantities of unprime furs that flood the market. Studies of the morphological and physiological factors involved have been undertaken and plans tentatively made for broadening the field of research. Investigational work by intrabureau cooperation was begun on the Upper Mississippi River Wildlife and Fish Refuge; the Blackwater Migratory Bird Refuge on the Eastern Shore of Maryland; the Bear River Migratory Bird Refuge, in Utah; and the Crescent Lake Migratory Bird Refuge, in western Nebraska; and plans were made to include other Federal refuges in the study. A small minkery and rabbitry have been constructed at the Blackwater refuge to compare findings from work at the fur animal experiment station, at the rabbit experiment station, and on Federal wildlife refuges.

KARAKUL-FUR INVESTIGATIONS

In a cooperative-project agreement with the Bureaus of Animal Industry and Home Economics on Karakul-fur investigations, 35 lambs ranging in age from 1 to 7 days were pelted during the spring and the raw pelts carefully inspected and graded, first by Bureau specialists and then by expert buyers of raw Karakul-sheep skins in New York, where they were dressed, dyed, regraded, and valued under present market conditions. The lamb pelts produced from purebred Karakul sheep were declared the most valuable, and a considerable number of pelts produced by crossbreeding with other sheep were also found marketable.

FACTORS INFLUENCING QUALITY IN FURS

A cooperative agreement was entered into with the Technical Association of the Fur Industry to obtain information on factors influencing the quality of fur in various pelts. At a meeting of the association, a representative of the Bureau read a paper on Conservation and the Molt Cycle, and in the June issue of the journal of the association there was published an article written cooperatively on Seasonal and Nutritional Studies on Animal Peltries, to make available the data thus far obtained.

PUBLIC WORKS ACTIVITIES ON FUR-ANIMAL EXPERIMENT STATIONS

The Public Works projects at the Bureau's fur-animal and rabbit experiment stations were practically completed before the close of the fiscal year. The erection of a new rat-proof feed-storage building at the fur-animal experiment

station makes it possible to purchase feed in larger quantities, thereby effecting a saving in maintenance costs. Other work there has increased the facilities for handling the animals. At the rabbit experiment station the new equipment provided included 192 all-metal hutches, which not only are ideal for experimental rabbit raising but are suitable also for commercial production. At the fur-animal station on the Blackwater Migratory Bird Refuge, a large unit of all-metal pens for muskrats, a small minkery, and a rabbitry were erected. The men employed on these projects, all of whom were selected from local relief lists, showed an appreciative interest in their work and on the whole rendered excellent service.

WILDLIFE DISEASE CONTROL

RELATIONSHIP OF DISEASE TO WILDLIFE POPULATIONS

Through a continuation of the work begun several years ago many important facts relating to wildlife disease conditions have been developed. In regions where losses occur periodically, definite areas with abundant game population have received detailed attention. In several of these test areas, tularemia, the most commonly encountered ailment, appears to have decimated the cottontail rabbits a year ago, while on the same areas the snowshoe hares and the grouse continued to increase. Through the process of trapping and examining large numbers of snowshoe rabbits and grouse, conclusive evidence is found that many had been affected with tularemia, indicating that these species are moderately resistant to some strains of the tularemia organism to which the cottontail rabbit readily succumbs.

Since, however, snowshoe rabbits and grouse are frequently found dead or affected with virulent strains of the tularemia organism, it is evident that under certain unknown conditions this disease does attack these forms. Cultures isolated from birds regularly show a lower virulence for laboratory test animals than is observed in those taken from mammals. The bird strains, however, when passed through a series of test animals, assume a more virulent nature, resembling the usual cultures taken from mammals.

In efforts to define the causes that periodically remove large portions of wildlife populations, a close study has been made of ticks, fleas, and other parasites capable of spreading destructive infections. These studies have disclosed a great increase in the abundance of ticks over that of a year ago. In one district the average tick population per snowshoe rabbit in the spring months was 2,110. This number represents an increase of 300 percent over those present last year. With this great number of blood-sucking parasites capable of transmitting infectious disease, a close study is being made to learn what part they may play in the actual destruction of wildlife. Already reports are being received of localized losses.

During the past year two obscure diseases of important game species have been studied. One of these, ulcerative enteritis, which has frequently been known to cause disastrous losses in quail and grouse on game farms, was found to occur also in wild ruffed grouse. The other, which is manifest in the form of horny growths on cottontail rabbits, has been shown to be caused by a filtrable virus. This disease is transmissible without difficulty by laboratory technic and is also doubtless spread very readily in the wild, since many individuals have been observed in the affected district. Efforts are being made to determine the relationship between such pathological conditions and game losses. An article was prepared for the Yearbook of Agriculture, 1934 (pp. 232-234), under the title "Game and Other Wild Species Suffer Heavy Losses from Disease."

FUR-ANIMAL DISEASES

Through the financial aid of a private fur company, a well-equipped fox ranch, where actual tests on disease prevention can be carried out, has been placed at the disposal of the cooperative organization of the Bureau and the University of Minnesota. Heretofore some of the treatments recommended after successful preliminary trials under well-controlled laboratory supervision failed to be completely satisfactory under practical ranch conditions. With this recent addition to the regular facilities the scientific workers will be able to give new products thorough tests before releasing them to the public. Frequent reports are received on the efficacy of the treatments and preventive meas-

ures already developed and recommended by this Bureau, and some conditions formerly considered serious are now regarded as of minor importance.

Special attention has been given to the relation of some of the disastrous disease outbreaks on fur farms to those occurring in the wild, including fox encephalitis and pseudotuberculosis.

RELATIONSHIP OF WILDLIFE DISEASE TO HUMAN BEINGS

Studies have been made during the past year of several outbreaks of diseases in wild forms, including rabies, spotted fever, and tularemia, which are of special importance because they are communicable to human subjects and domestic animals. Information was furnished local inquirers on methods for checking the spread of these diseases.

POLLUTION OF WATERS

Dumpage of oil and other injurious forms of waste into public waters continues to menace waterfowl, and several instances were brought to the attention of the local officials who have authority to prevent these destructive practices. Lead poisoning in waterfowl is evidently increasing through the pollution of feeding areas with shot. The details of this condition have been placed in the hands of metallurgical chemists with a view to experimentation in developing a nontoxic type of projectile for use in wildfowling.

During the year Technical Bulletin No. 411 was issued on Western Duck Sickness, a Form of Botulism, based on survey studies made in 1929, 1930, and 1931 on western marshy areas and saline lakes, where the disease has taken devastating toll of waterfowl.

ACQUISITION OF LANDS FOR WILDLIFE REFUGES

The main work in refuge-land acquisition was this year directed to the completion of the contracts that had previously been made through the vesting of title in the United States to such lands as were under contract, and to the surveying, monumenting, and posting of the boundaries of the lands so taken. During the year, titles to 485 acres were conveyed to the United States for use as migratory-bird refuges under the Migratory Bird Conservation Act; 2,319 acres were acquired in the same manner under the provisions of the Upper Mississippi River Wildlife and Fish Refuge Act; and 325 miles of boundary lines were relocated and posted. So far as financial resources would permit investigations were conducted to determine refuge opportunities on public lands and whether lands acquired by the United States for some other purpose might serve also as wildlife sanctuaries.

REFUGES UNDER MIGRATORY BIRD CONSERVATION ACT

The creation of refuges for migratory birds through the process of acquisition by purchase was brought to a virtual standstill during the fiscal year 1934 for lack of funds. The Biological Survey recommended the creation, by Executive order, of two refuges, however, containing 136,624 acres. One of these, the Killcohook Migratory Bird Refuge, on the Delaware River, embraces 1,440 acres of land and water in Salem County, N. J., and Newcastle County, Del. The area is under the jurisdiction of the War Department and is being used by that Department in connection with the improvement of the channel of the Delaware River. It is in a zone where land prices are considerably higher than the limits at any time set by the Biological Survey for migratory-bird refuge areas and is in a region where it will serve a highly useful purpose in offering a safe resting and feeding place for ducks and geese in migration, and in providing an outdoor laboratory for studies of fur animals, particularly muskrats.

The Railroad Valley Migratory Bird Refuge, containing 135,184 acres in Nye County, Nev., previously temporarily withdrawn, was constituted a permanent refuge by an Executive order dated May 2, 1934. Funds were provided under the National Recovery Act to improve the area by developing and impounding an artesian water supply, and the work is in progress. This refuge will provide a resting and feeding place in the center of an immense desert area.

On June 29 an option was taken for the purchase of 45,000 acres of land and water for establishing the White River Migratory Bird Refuge, in Arkansas, Monroe, Phillips, and Desha Counties, Ark. Departmental approval was given

in July 1934, and acquisition will be from funds made available in the F. E. R. A. land program. The area will serve as a resting ground for the waterfowl that traverse the Mississippi Valley flyway, the most common of which are mallards (about 80 percent of all), pintails, widgeons, and teals.

During the year 120 acres of land were conveyed by gift to the Biological Survey by the National Association of Audubon Societies for inclusion in the Charles Sheldon Wildlife Refuge in northwestern Nevada, thus solidifying and greatly enhancing the value of this sanctuary for antelope and other species.

Table 1 sets forth the present status of the refuge acquisitions under the Migratory Bird Conservation Act.

TABLE 1.—*Refuge areas acquired and approved for acquisition under the Migratory Bird Conservation Act program, to June 30, 1934*

State and county	Refuge	Areas approved by the Migratory Bird Conservation Commission for purchase and lease-purchase			Other areas acquired	Total
		Acquired by purchase	Pending title conveyance under purchase agreement	Total		
		<i>Acres</i>	<i>Acres</i>	<i>Acres</i>	<i>Acres</i>	<i>Acres</i>
Alaska.....	Semidi Islands.....				¹ 8,920	8,920
Arizona, Mohave.....	Boulder Canyon (see also Nevada).....				¹ 312,687	312,687
California, Imperial.....	Salton Sea.....	8,982		8,982	¹ 36,578	45,560
Delaware, Newcastle.....	Killehook (see also New Jersey).....				¹ 586	586
Florida:						
Levy.....	Cedar Keys.....				¹ 224	224
Hernando.....	Chinsegut Hill.....				² 2,033	2,033
Jefferson, Taylor, and Wakulla.....	St. Marks.....	19,313		19,313	¹ 16,298	35,611
Georgia, McIntosh.....	Wolf Island.....				¹ 538	538
Maine, Knox.....	Widows Island.....				³ 12	12
Maryland, Dorchester.....	Blackwater.....	8,241		8,241		8,241
Montana, Cascade and Choteau.....	Benton Lake.....				¹ 12,235	12,235
Nebraska, Garden.....	Crescent Lake.....	40,609		40,609	¹ 173	40,782
Nevada:						
Clark.....	Boulder Canyon (see also Arizona).....				¹ 346,443	346,443
Churchill.....	Fallon.....				¹ 17,902	17,902
Nye.....	Railroad Valley.....				¹ 135,184	135,184
New Jersey, Salem.....	Killehook (see also Delaware).....				¹ 854	854
New Mexico, Chaves.....	Roswell.....				¹ 1,962	1,962
North Carolina, Hyde.....	Swanquarter.....	15,341	151	15,492		15,492
North Dakota, Burleigh and Kidder.....	Long Lake.....	5,292		5,292	¹ 4,810	7,102
Oklahoma, Alfalfa.....	Salt Plains.....				¹ 19,452	19,452
South Carolina, Charleston.....	Cape Romain.....	22,452		22,452	¹ 31,613	54,065
Utah, Box Elder.....	Locomotive Springs.....				¹ 1,013	1,013
Washington, Grant.....	Lenore Lake.....				¹ 4,682	4,682
Wyoming:						
Albany.....	Bamforth Lake.....	965		965	¹ 4,199	2,164
Do.....	Hutton Lake.....	1,248		1,248	¹ 4,460	1,708
Total.....		122,443	151	122,594	952,858	1,075,452

¹ By Executive order or proclamation.

² By gift.

³ By act of Congress.

⁴ By lease without option to purchase; acquisition approved by the Migratory Bird Conservation Commission.

⁵ By cession.

WILDLIFE REFUGE ADMINISTRATION

The establishment of two wildlife refuges during the year brought the number now supervised by the Bureau of Biological Survey to 104.

BIG-GAME PRESERVES

In accordance with the policy of preventing overgrazing of the ranges, surplus big-game animals in the herds were removed during the season 1933-34, some of the buffalo, elk, and deer being donated for use as meat to needy Indians at nearby agencies. The number of big-game animals on the four fenced enclosures was 1,558, an increase of 159 over the number last year. The numbers of the various species are shown in table 2.

TABLE 2.—*Animals on fenced big-game preserves maintained by the Bureau of Biological Survey*¹

Preserve	Buf- falo	Elk	Ante- lope	Moun- tain sheep	Deer		Total ²	Young born in cal- endar year 1933 ³		
					White- tailed	Mule		Buf- falo	Ante- lope	Moun- tain sheep
National Bison Range, Mont.....	530	⁴ 141	-----	60	⁴ 29	⁴ 108	868	94	-----	18
Wind Cave Game Preserve, S. Dak....	258	⁴ 58	⁴ 58	-----	2	⁴ 18	394	47	7	-----
Niobrara Game Preserve, Nebr.....	140	59	12	-----	3	1	215	26	2	-----
Sullys Hill Game Preserve, N. Dak....	25	⁴ 46	-----	-----	10	-----	81	3	-----	-----
Total.....	953	⁴ 304	⁴ 70	60	⁴ 44	⁴ 127	1,558	170	9	18

¹ With the exception of those of young born, figures are for June 30, 1934.

² Including estimates.

³ Young of elk and deer omitted as in most cases only estimates could be made; during the calendar year, however, 81 elk calves, and 35 mule deer and 14 white-tailed deer fawns were seen on the preserves.

⁴ Estimated.

NATIONAL BISON RANGE

A mild and rainy winter made the grass ripen about 3 weeks earlier than usual on the National Bison Range in Montana, and at the end of the year the forage was in the best shape it has been in during the past 3 years. To avoid depletion of the forage through overgrazing, surplus animals were donated to the Flathead Indian Agency and removed from the range. The surplus elk, in 1933, furnished for stocking an area in the State of Washington were liberated on an area adjacent to the Mount Rainier National Park instead of, as reported last year, on the park lands proper.

There have been born this season 67 buffalo calves and 19 mountain-sheep lambs, but 10 of the calves and 1 lamb died before the end of June; 15 elk and 25 deer fawns have been seen. The albino buffalo, born last year, is thriving and continues to be a great attraction for visiting tourists.

Improvements on the preserve under P. W. A. funds included the construction of 3 towers, 19 wooden tanks, and 3 reservoirs for the conservation of the water supply, as well as bridges, culverts, roads, and a telephone line.

WIND CAVE GAME PRESERVE

A mild winter left the animals on the Wind Cave Game Preserve, South Dakota, in excellent condition, with the exception of a few old or injured individuals. Increases included 50 buffalo calves, 3 elk calves, and at least 2 antelope fawns. Surplus animals disposed of included 27 buffalo for breeding and exhibition purposes, 20 of which were transferred to the nearby Custer State Park. An excellent forage crop was produced in the summer of 1933, but this year's crop was reduced below normal by the exceedingly dry spring and summer.

Improvements under allotment of P. W. A. funds included the construction of an exhibition pasture for the buffalo, fence wings for the east pasture, capturing corrals, roads, and trails to facilitate the protection of the animals and the administration of the area, and general repairs to the game fences.

ELK REFUGE

The winter was exceptionally mild in Jackson Hole, Wyo., and the few snows soon melted in the valley, leaving the meadow and pasture lands bare most of the time. It was the fourth winter since the elk refuge was established in 1912 that it was not necessary to feed the elk. The first elk appeared on the refuge on October 16, but it was not until snow fell in the first week in December that the animals began to migrate to the valley in large numbers. By the end of December approximately 4,000 had gathered on the refuge and in the nearby foothills, but not more than 4,500 wintered there. The meadow and pasture lands furnished sufficient forage, and the animals came through the winter with comparatively little loss from any cause. Probably not more than 650 tons of hay, about a half of the normal crop, was produced this season, and at the end of the year, with the soil dry to a depth of several feet, there was so short a crop of forage on the open ranges and pasture lands that if the coming winter should be severe there would be an acute feeding problem on the refuge and in the vicinity.

Improvements made with the P. W. A. funds allotted included repairs to buildings, the construction of 2 barns, 5½ miles of fence, 3 corrals, 4 miles of telephone line, and 6 sheds for storing emergency rations. A fire-prevention system was installed and the irrigation system extended and reconditioned.

SULLYS HILL GAME PRESERVE

The big-game herds on the Sullys Hill Game Preserve, North Dakota, have been increased by the birth of 5 buffalo calves, 2 white-tailed deer fawns, and at least 10 elk calves. During the fiscal year 13,893 persons with 2,475 cars visited the preserve.

About half of the 500 acres of timberland on the preserve was thinned out during the winter and early spring under a C. W. A. project, which provided work for unemployed people and furnished the needy with 568 loads of surplus wood. Improvements under P. W. A. funds included the construction and repair of roads and trails, the erection of a machine shed, digging a ditch to carry water during dry years to a small lake in the preserve, and the removal of a large accumulation of silt from the lake. Also a contract was let for the completion of an interlocking steel-piling dam to preserve the level of Sweetwater Lake.

NIOBRARA GAME PRESERVE

The big-game animals at the Niobrara Game Preserve, Nebraska, have been increased by 30 buffalo calves, 2 antelope fawns, and at least 12 elk calves. Surplus animals disposed of included 15 buffalo and 18 elk.

Extensive improvements under P. W. A. and E. C. W. funds included the construction of 5 miles of interior big-game fence, 7 miles of stock fence, and 16 miles of big-game fence enclosing 11 sections of land as a pasture for antelope, 6 large dams to create breeding and nesting areas for waterfowl, roads and trails in the north and south pastures, and 2 big-game exhibition pastures near headquarters. An excellent fire-prevention system is about completed, and a steel lookout tower has been erected.

CHARLES SHELDON WILDLIFE REFUGE

Continued drought conditions throughout the West were adversely affecting all animal life on the Charles Sheldon Wildlife Refuge and adjacent parts of Nevada as the year closed. Livestock has recently been excluded from the refuge's 48 square miles, and in the areas free from the disturbance of improvement activities in progress the resulting beneficial effect on wildlife is apparent.

Antelope, accustomed to migrate east and south late in November or early in December, ranged on the refuge throughout the year, more than 1,200 being within the refuge in February and March. The numbers lessened in spring as the bands broke up, and drought conditions and improvement activities left only approximately 400 in the region at the end of the fiscal year. An encouraging feature was the increase in sage grouse over the numbers observed in 1933. Mule deer are holding their own well in this section, but

drought conditions seriously diminished the numbers of migratory insectivorous and song birds.

Improvements made with P. W. A. funds included the construction of 28 miles of stock fence, an observation tower, and new headquarters buildings, and work on water conservation.

BIRD REFUGES

NEW REFUGES ESTABLISHED

Two new wildlife refuges, chiefly for the protection of migratory birds, were created and placed under the jurisdiction of the Biological Survey during the year. These were the Killcohook and the Railroad Valley migratory-bird refuges (p. 17).

BIG LAKE BIRD REFUGE

Water conditions in the spring were favorable for the ducks on the Big Lake Bird Refuge, Arkansas. Mallards, pintails, and black ducks were present in normal numbers and remained well into May. Scaups, ringneck ducks, and gadwalls were less abundant than usual. Blue-winged teal and shovelers appeared in May, but also in reduced numbers. Goldeneyes, buffleheads, canvasbacks, red-heads, American widgeons, and green-winged teal were scarce. Conditions were suitable for wood ducks and hooded mergansers, and a normal number of these birds nested and raised broods of young. A goodly number of sandpipers, woodcock, and killdeer were observed during the spring. Egrets, herons, and bitterns also frequented the area, and large numbers of wood ibises were present. Thousands of migratory insectivorous birds visit the refuge, and many remain the year round.

Under an allotment of P. W. A. funds the refuge boundary lines have been newly surveyed, and at the close of the year the construction of a new headquarters house and a fire and observation tower was under way. Surveys also were completed, and plans were maturing for water-control improvements that will restore the lake to its original levels.

LAKE MALHEUR BIRD REFUGE

Practically the entire bed of Lake Malheur, Oreg., was dry by late spring, and the only water entering came from one large spring. A good portion of this water is being diverted to hay lands, however, and does not reach the lake. The area within the refuge not grazed is producing a dense growth of foxtail grass, and part of it has been cut for hay by neighboring ranchers. Extreme scarcity of water in the refuge discouraged much waterfowl nesting, but a number of ducks and geese were resting in a spring at a nearby homestead. The case of the *United States v. The State of Oregon*, to determine ownership of lands in the lake bed and vicinity was still pending at the close of the year, the special master appointed to hear the case not having made his recommendations to the supreme court.

BLACKWATER MIGRATORY BIRD REFUGE

During the period the C. C. C. camp was on the Blackwater Migratory Bird Refuge, Maryland, the work accomplished included the construction of roads and trails, 3 lookout towers, a bridge, 2 wells, and a telephone line, improvements to headquarters, and the removal of fire hazards from an extensive area. Since the extremely cold weather in February and March, when all the waterways froze and made it difficult for waterfowl to find food, there has been no great number of ducks on the refuge at any time, and only about half as many were there last spring as a year ago. Conditions for the nesting waterfowl were not quite so favorable as in the previous year, some areas having been burned over, and a hurricane in August and high salt tides having destroyed many trees, shrubs, and nesting cover.

CRESCENT LAKE MIGRATORY BIRD REFUGE

Approximately 2,500 pairs of ducks, 2,500 pairs of grebes, and 3,000 pairs of coots stayed on the Crescent Lake Migratory Bird Refuge, Nebraska, during the summer of 1933, a decided increase over the number the previous year. Ob-

servations in 1934, however, indicate a decrease of about 10 percent in nesting waterfowl, due in part to the lower water levels and constantly diminishing water areas. The country in and around the refuge, however, is better supplied with water than are other parts of the sandhill section. On June 30 most of the lakes were down to the lowest point reached in the fall of 1933, but there was still considerable water and an abundance of aquatic waterfowl foods. Some lakes showed a slight increase in waterfowl, though others were severely depleted.

At the height of the fall migration the last of October a bird census indicated about 40,000 ducks on the refuge, and old residents of the locality stated that they had seen more mallards this year than for several years. A snowstorm and accompanying cold weather on November 4 closed all but two of the lakes, and all but about 4,000 of the ducks left the refuge, though a few days later many returned when the lakes opened up again. By January 1 all lakes were frozen over, and the ducks were gone. The open-winter conditions brought back the first mallards around the first of February, at least a month earlier than usual, and about March 25 more than 35,000 ducks were on the area. Large numbers of snow geese stopped during the spring flight. Curlews, avocets, and upland plover showed an increase of about 10 percent over last year, but willets, lesser yellowlegs, and sandpipers decreased about 20 percent. The increase of Chinese pheasants moves to the farming country to the south, leaving about the same number of birds on the refuge each year. During the winter 26 pheasants were fed at the headquarters. Muskrats are on the increase in many of the lakes, and coyotes are plentiful.

With P. W. A. and E. C. W. funds a 45-foot steel lookout tower was erected on a high hill, a new headquarters building is being constructed, a telephone line from Alliance, Nebr., to the headquarters was practically completed, 4 nesting areas on the east side of the refuge were fenced, 186 acres of lowland were planted to trees, and road improvement to headquarters made.

ST. MARKS MIGRATORY BIRD REFUGE

Improvements made by C. C. C. workers at the St. Marks Migratory Bird Refuge, Florida, during the year included the construction of about 14 miles of truck trail, 19 miles of telephone line, a machine shop, lookout towers, a fire-prevention system, a wharf, and repairs to existing buildings, and surveys.

SWANQUARTER MIGRATORY BIRD REFUGE

A great number of canvasback ducks and many geese and swans were observed at various times during the winter on the Swanquarter Migratory Bird Refuge, North Carolina. With the aid of the C. C. C. camp established on this refuge, a headquarters building and an artificial channel some 800 feet long across Judith Island were constructed, a 100-foot tower built, and two 45-foot towers have been erected or are under construction.

UPPER MISSISSIPPI RIVER WILDLIFE AND FISH REFUGE

The protracted drought established for the second successive year a low-water record at many points in the Upper Mississippi River Wildlife and Fish Refuge. The many valuable lakes, marshes, and sloughs remaining dry for part of the year greatly limited the crop of wild-fowl food and reduced the attractive habitats for waterfowl. About the usual numbers of wild ducks passed over during the fall migration of 1933, and apparently a larger number of wild geese were killed along the river than normally, the birds concentrating on smaller water areas and thus enabling the hunters to get within closer range. Instead of the concentrated migration of geese similar to that of the preceding year, the spring migration began at a time when water conditions were unfavorable and the birds were hard pressed for both food and resting grounds. A substantial rise in water levels following an extremely heavy snowfall shortly after the arrival of geese flooded much of the bottom land, to the material advantage of the birds. There appeared to be an abundance of food, and the birds concentrated in large numbers throughout the length of the refuge wherever conditions were at all attractive.

The concentration of ducks along the Mississippi River flyway made an unusually heavy migration through the refuge during the spring of 1934. Pintails and mallards again predominated, and wood ducks also were relatively abundant, but reports indicate that the drying up of lakes and marshes in these areas caused them to abandon several of their former breeding grounds.

An investigation during the past spring to ascertain the approximate number of breeding waterfowl on the refuge brought disappointing but not surprising results. Low water levels and a rank growth of vegetation attracted large numbers of upland birds to the bottom lands, and ring-necked pheasants and quail especially have established themselves there in substantial numbers. A number of deer also wintered in the refuge along Black River section in La Crosse County, Wis.

Thirty-one fires burned over a total of 7,591 acres on the refuge during the year. Under the current fire-detection system, more reports are being obtained, and observers are reporting them more promptly than in the past.

The unprecedented drought throughout the length of the refuge resulted in a greatly augmented number of requests for permission to graze domestic stock on refuge lands. Immediate steps were taken to promulgate regulations to prevent overgrazing and other damage, and the restricted grazing authorized was only on areas carrying a minimum supply of game. Because of the strictly limited grazing allowed, there was little or no interference with the wildlife.

BEAR RIVER MIGRATORY BIRD REFUGE

The Bear River Migratory Bird Refuge, Utah, is each year attracting increased numbers of waterfowl, and additional species are being added to the list of birds observed on the protected area. Numbers of waterfowl, particularly ducks and geese, remained on the refuge during the entire winter season, which was exceptionally open. Worthy of special note is the fact that about 6,000 whistling swans remained as compared with 1,500 to 2,500 in previous years.

Duck sickness was far less extensive than in 1932, when there was a serious outbreak. In 1933 it was first in evidence on August 5 and continued until September 27, when the counting of sick and dead birds was discontinued. During the period of the count 488 dead birds were found, and 2,488 showed evidence of being affected. In 1932 on the refuge proper, 32,769 dead ducks were gathered up and disposed of, and it was estimated that 250,000 or more died outside, in the area known as "Willard Spur."

On the public shooting grounds authorized on the refuge by the Bear River Migratory Bird Refuge Act, there was a considerable increase in the number of hunters during the shooting season of 1933, but the average bag was less than in 1932.

Improvements on the refuge made possible by the allotment of P. W. A. funds included the completion of approximately 14 miles of a 4-wire stock fence along the north and west sections, erection of 2 steel observation towers, grading of 22 miles of dike roads, and dressing the main dike for a distance of about 13 miles. The top of the dikes was graveled for approximately 18 miles, and considerable work was done in water control.

ADMINISTRATION OF LAWS FOR WILDLIFE CONSERVATION

On March 6, 1934, the President approved, to become effective on June 16, 1934, the Migratory Bird Hunting Stamp Act, to which reference has already been made (pp. 2-3). Other statutes administered by the Biological Survey include the Migratory Bird Treaty Act of 1918; the Lacey Act of 1900, relating to interstate shipments and importations of wild birds and mammals; a law affecting animal life and property on Federal wildlife refuges; the Migratory Bird Conservation Act of 1929, authorizing establishment and administration of bird refuges; and, through the Alaska Game Commission, the Alaska Game Law of 1925.

ENFORCEMENT PERSONNEL

A reduction from 25 to 22 in the field force of United States game protectors caused by lack of funds necessitated the abandonment of 3 enforcement districts. The reorganization of field forces under the new Division of Game Management will furnish added supervision of law enforcement. Some of the proceeds from the sales of waterfowl stamps will permit the employment of more field agents, but an adequate financing of enforcement personnel is still one of the great needs in the control of law violations.

A mobile force of United States game protectors and Federal deputy game wardens was drawn from other districts to operate during the close season in the Middle West and give special attention to areas in the Mississippi River flyway. As a result of their concentrated action 78 out-of-season shooters were apprehended and many others put their guns back on the racks.

MEASURES TO CONSERVE WATERFOWL

The Advisory Board, Migratory Bird Treaty Act, met at Washington, D. C., on July 10 and 11, 1933. A public hearing was held on August 28 of that year on a proposed baiting regulation. The Survey was requested by the Board to make a study of baiting practices before its 1934 meeting (p. 9). The hunting seasons for 1933-34 were practically the same as in the previous year, but jacksnipe were given the same seasons as waterfowl. The season on brant was closed on the Atlantic coast because of the shortage of the eelgrass (p. 9), while hunting of cackling geese was again permitted. The bag limit on wild ducks was reduced from 15 to 12 a day, of which not more than 8 of any one or 8 in the aggregate might be canvasbacks, redheads, scaups, ringnecks, teals, shovelers, and gadwalls. The possession limit on woodcock was fixed at 12.

Publications issued during the year on the enforcement of conservation laws included the annual bulletin on the game laws (Farmers' Bulletin 1717), the text of the amended regulations under the Migratory Bird Treaty Act, and of other Federal laws relating to game and birds (Service and Regulatory Announcements, B. S. 78), a poster (no. 52) giving the open seasons on migratory game birds, a mimeographed abstract of the fur-trapping seasons, the annual directory of Federal, State, and Canadian game protection officials (Miscellaneous Publication 166), and in the Yearbook of Agriculture, 1934, a table (514, p. 743) on hunters' licenses issued by States, with total money returns, for the seasons 1931 and 1932. There was also prepared in the Biological Survey during the year a poster on the new migratory-bird hunting stamp, for distribution to post offices, and a combined application and report form to be used in obtaining the stamps. Press statements were issued on the purchasing of the stamps and the purposes for which the funds obtained thereby would be expended.

LAW VIOLATIONS AND PENALTIES

CASES UNDER MIGRATORY BIRD TREATY ACT

There was an increase of 100 over the preceding fiscal year in the number of cases of violation of the Migratory Bird Treaty Act reported by the Department for prosecution, a relatively slight decrease in convictions obtained, and an increase in the number of cases disposed of (table 3). In 56 cases action was not recommended on account of lack of evidence, youthfulness of the accused, or other satisfactory reasons. Fines and costs ranging from \$1 to \$200 and aggregating \$5,172 were assessed in the Federal courts. Jail sentences were imposed as follows: 1 hour in custody of marshal, 1; 1 day in custody of marshal, 2; 1 to 18 days' confinement, 9; 30 days, 3; and 60 days, 1. Sentences were suspended in 3 cases for 5 years each; in 1 case for 2 years; and in 11 cases defendants were placed on probation. Jail sentences ranging from 30 days to 12 months were suspended in 6 cases. Six cases tried before a jury resulted in verdicts of guilty. Seizures of migratory game birds had an estimated value of \$800, and such birds as could be utilized for food were donated to hospitals and other public charitable institutions.

TABLE 3.—*Cases of violation of the Migratory Bird Treaty Act disposed of during the fiscal year and cases still pending June 30, 1934*

Cases disposed of	Num- ber	Cases pending	Num- ber
Convictions.....	274	Pending from former year.....	344
Dismissals.....	105	New cases.....	452
Verdicts of not guilty.....	15	Total.....	796
No bills found.....	5	Disposed of.....	447
Nol-prossed.....	32	Pending at end of year.....	349
Death of accused.....	1		
Denied leave to file.....	8		
Statute of limitations.....	3		
Stricken from docket.....	4		
Total.....	447		

For killing ducks in close season, 3 violators in California were each given the alternative of a fine of \$200 or 90 days in jail, and 3 others in the same State received jail sentences of 18 days each. On the same charge 1 violator in Missouri paid a fine of \$100, and 1 in Washington a like fine and costs of \$72.30. Possession of ducks in close season brought a suspended sentence of a \$100 fine and 6 months in jail to a violator in Maryland, and a similar case in Washington was disposed of by a 10-day jail sentence. In Georgia 2 cases of killing doves in close season were terminated by the imposition of 12-months' suspended sentences. One violator charged with killing sandpipers in Virginia was fined \$100 and given 6 months in jail, the sentence being suspended; and in the same State 2 others charged with possessing geese in close season were sentenced to serve 60 days each in jail, but sentence was suspended for 2 years.

Other cases of violation of the Migratory Bird Treaty Act successfully disposed of during the year included possession of swans, 2 (in Maryland); killing wood ducks, 3 (in Georgia); killing ducks from motorboats, 3 (in Georgia); killing ducks and geese in excess of daily bag limit, 10 (6 in Louisiana, 4 in Florida); shooting ducks over more than 25 live decoys, 4 (in Missouri); and killing doves over baited fields, 45 (3 in Alabama, 42 in Georgia).

UPPER MISSISSIPPI RIVER REFUGE CASES

Three cases involving trapping on closed areas or during the close season on the Upper Mississippi River Wildlife and Fish Refuge were reported for prosecution; 2 were closed by jail sentences of 30 days each. Nine cases previously reported—4 involving hunting on closed areas, 4 for hunting raccoons, and 1 for carrying firearms in a closed area—were terminated; 3 fines of \$15 were assessed, 5 cases were dismissed, and in 1 the grand jury did not return a true bill.

Of 34 cases involving violations of State game and fish laws on this refuge, 32 were disposed of—10 by fines and costs totaling \$387.46; 10 by jail sentences, 5 by jury verdicts of not guilty, 4 by suspension of sentence upon payment of costs, 1 by a 6-months' jail sentence, 1 by abandonment of prosecution, and 1 by dismissal.

WILDLIFE RESERVATION TRESPASS ACT CASES

For violations of the law protecting wildlife and Government property on Federal reservations (sec. 84 of the Criminal Code), 3 cases were reported for prosecution. Two of these (both in Wyoming) were terminated by fines of \$25 each.

INTERSTATE SHIPMENTS OF WILD MAMMALS AND BIRDS

Protectors working under the Lacey Act inspected records at raw-fur receiving centers in 11 States, and discovered evidence of many infractions of State game laws. Information regarding 4,118 shipments containing skins of fur-bearing animals illegally taken or shipped were transmitted to State game departments in 28 States. In 12 States 339 cases based on information originally furnished by the Survey were closed by fines and costs of \$2,974. In 1,322 other investigations by the States it was determined that 1,207 shipments were lawfully made and in 115 others that prosecution would be inadvisable. The game departments of 28 States were furnished evidence regarding 342 cases involving violations other than illegal interstate shipments of skins of fur-bearing animals. As a result of these prosecutions, fines and costs in State courts amounted to \$8,779.23.

WILDLIFE CONSERVATION IN ALASKA

LAW ENFORCEMENT

Few changes were made in the regulations for the 1934-35 hunting and trapping seasons under the Alaska Game Law. Reduction of funds in the previous year necessitated dropping one of the force of 10 wardens, and a further reduction has brought the active field force to 7 and reduced the executive office staff. Curtailment of enforcement patrols has tended to increase violations in outlying areas. An allotment of \$195,700 by the Public Works Administration has, however, provided for urgently needed equipment for the

Bureau's work in Alaska through the operating agency—the Alaska Game Commission. Of this sum, \$160,800 was allotted for building and equipping six patrol boats and the remainder for the construction of docks, floats, small storehouses, and the administrative buildings for field offices and wardens' living quarters.

WILDLIFE RESTOCKING PROJECTS

An allotment of \$25,000 provided through the Governor of Alaska by the Federal Emergency Relief Administration to carry out a program of wildlife restocking work authorized by the Civil Works Administration, enabled the Alaska Game Commission to push forward the Territorial program of restocking depleted areas with game and fur animals. The funds were primarily for unemployment relief among native Indians and Eskimos, an average of about 65 of whom, including Aleuts and halfbreeds were engaged in their communities from January 1 to March 31. Trained foremen were taken from the relief rolls and with one exception were registered guides. Alaska game wardens supervised the operations.

The capture, handling, and shipment of the animals in subzero temperatures presented a problem never before experienced in this type of work, and the men had to be housed, in the dead of winter, in tent camps, many of them in 3 or more feet of snow. Nevertheless, 558 of the 586 snowshoe rabbits captured in the interior of the Territory were liberated on the northeastern end of Kodiak Island, 39 Sitkan black-tailed deer taken in southeastern Alaska were liberated near Yakutat and on Kodiak Island, and 22 martens from the mainland of southeastern Alaska were placed on the Prince of Wales and Baranof Islands.

The herd of 23 buffalo transplanted to Alaska 5 years ago from the National Bison Range, has thrived and more than doubled in number, according to reports received in December. The animals, observed in two herds on the Jarvis Creek flats southeast of Fairbanks, numbered 60, including calves and yearlings.

A survey was made of the moose range on the Kenai Peninsula to determine the number of these game animals present and their relationship to the available forage.

ATTRACTIONS OF WILDLIFE FOR TOURISTS

Recent publicity regarding the big bears has increased the number of sportsmen and noted big-game hunters who plan to visit the Territory this year. There is a growing feeling in the Territory that the bears thus constitute a valuable resource, but many prospectors, fishermen, and others look upon them as potential enemies to be shot at sight. Active patrols are especially needed during spring and summer, when the bears come to the beaches and mouths of streams for salmon, but the enforcement difficulties are increased by lack of funds.

IMPORTATION AND OTHER PERMITS ISSUED

PROHIBITED SPECIES EXCLUDED UNDER THE LACEY ACT

Since the enactment of the Lacey Act in 1900 no forbidden species of bird or mammal has established a foothold in the United States, and the English sparrow and starling, then established, have not been augmented by any importations.

So far as known, no prohibited species was entered during the year. An importer in San Bernardino, Calif., who had received nine Chinese crested mynas from the Orient, was notified that the birds should either be returned or destroyed, and the birds were immediately killed.

BIRDS ENTERED UNDER PERMIT

Importation permits issued during the year numbered 1,186, an increase of 274 over the number in 1933. Shipments inspected decreased from 267 to 175. Twenty-six additional permits were issued at Honolulu, Hawaii, for the entry of 346 miscellaneous birds. There were also imported at San Juan, Puerto Rico 636 miscellaneous birds. The total number of all foreign birds imported was 263,735, a decrease of 47,301 from the number imported last year. Included in the total were 207,701 canaries, 1,911 parrots, 13,611 Mexican quail, 8,000

valley quail, 2,300 Hungarian partridges, 900 pheasants, and 29,312 miscellaneous birds.

The Bureau during the year ruled that ships' crews are not exempt from the customs regulation permitting passengers to bring in with them as baggage, without permit, not to exceed 5 canaries or 5 parrots, and this view was sustained by subsequent ruling of the Treasury Department.

For failure to obtain an importation permit from this Bureau within the time limit, a Philadelphia dealer in birds and other animals was assessed \$50 on his bond.

The number of bobwhite quail imported from Mexico during the 1934 season was only 13,611, as compared with 22,110 last year, though prior to the opening of the season the Mexican Government had granted concessions to six individuals for the exportation of a total of 75,000 birds. The decrease was probably due in part to the fact that the Mexican Government, by resolution passed on March 12, 1934, prohibited the exportation of any quail from Mexico after March 31, because of a depletion of the species in certain agricultural sections, particularly on the northern frontier, thus shortening the season from the former 2½ months to 1½ months. All entries of these quail were made at the ports of Eagle Pass and Laredo, Tex., where inspectors of the Bureau of Animal Industry, cooperating with this Bureau, made examinations and issued permits. The quail were shipped mainly to 11 States, as follows: Texas, 3,469; Tennessee, 3,300; Indiana, 2,795; Kentucky, 1,500; Oklahoma, 800; Mississippi, 500; Alabama, 320; Florida, 260; New York, 200; Illinois, 100; and West Virginia, 100. The rest of the birds, numbering about 240, were distributed to Pennsylvania, Vermont, New Hampshire, North Carolina, Georgia, and California. The total number of bobwhite quail brought in since 1910 is approximately 727,000.

Eight thousand valley quail were imported by the California Fish and Game Commission from Baja California for stocking purposes in southern California.

This year no Hungarian partridges were imported from European countries, but about 2,300 were brought in from Canada, largely for stocking in North Dakota and South Dakota.

Three peuras, or common hill-partridges (*Arborophila torqueola*), and nearly 200 chukar partridges (*Alectoris graeca chukar*) were imported from India; 54 francolins (*Francolinus coqui*) from Benguela (Portuguese West Africa), and 23 other partridges, species unknown, from Colombia, South America.

More than 900 pheasants were imported during the year, comprising many species, and including among the more interesting, 19 copper pheasants (*Graphephasianus soemmerringii*), 13 Edwards pheasants (*Hierophasis edwardsi*), 2 Swinhoe pheasants (*H. swinhoii*), 4 Siamese crested firebacks (*Diardigallus diardi*), 2 ring-necked pheasants (*Phasianus colchicus torquatus*), and 1 Bornean pheasant (*Lophura ignita*), from Japan; and 19 tragopans (*Tragopan satyra*), 2 ring-necked pheasants (*P. colchicus torquatus*), 6 cheer pheasants (*Catreus wallichii*), 18 Koklass pheasants (*Pucrasia macrolopha*), 26 Impeyan pheasants (*Lophophorus impejanus*), 8 Kaleege pheasants (*Gennaeus leucomeganos*), and 6 golden pheasants (*Chrysolophus pictus*) from India.

Fewer canaries and other cage birds were imported this year than last. Parrots and parrakeets in comparatively small shipments are still being imported, though under the Public Health Service regulations birds of the parrot family less than 8 months old are not admitted, and occasional instances of parrot fever have been reported during the year. Four budgerigars refused entry for lack of the foreign sanitary certificate of origin called for in the regulations, were returned to Glasgow, Scotland, whence they were shipped, and about 4 weeks later were sent back with the required certificate.

Among the rare and more interesting birds imported during the year were 2 manded geese (*Chenonetta jubata*), 2 Australian ducks (*Anas superciliosa*), 32 yellow-rumped finches (*Donacola flaviprymna*), and 7 spotted-sided finches (*Tavistocka guttata*) from Australia; 25 rice quail (*Coturnix* sp.), 24 baya weavers (*Ploceus philippinus*), and 2 silver-eared hilltits (*Mesia argentauris*) from India; 2 red-faced love birds (*Agapornis pullaria*) from Africa; 6 spur-winged geese (*Plectropterus gambensis*) from Benguela; 6 jackass penguins (*Spheniscus demersus*); 2 wood hoopoes (*Phoeniculus purpureus*), and 2 hammerhead storks (*Scopus umbretta*) from South Africa; 3 painted quail (*Excalfactoria chinensis*), 96 button quail (*Turnix* sp.), and 3 owl finches (*Steganopleura bichenovii*) from Japan; 3 green jungle fowls (*Gallus varius*) from Singapore; 2 nutmeg pigeons (*Myristicivora bicolor*) from the Philippine

Islands; 12 Galapagos penguins (*Spheniscus mendiculus*) from the Galapagos Islands; 3 blue honey creepers (*Cyanerpes cyaneus*) 8 cocks of the rock (*Rupicola rupicola*), and 40 silver-billed tanagers (*Ramphocelus bresilius*) from Brazil; and 12 tanagers (*Tangara guttata chrysophrys*) from Venezuela.

MAMMALS ENTERED

Importations of black bear cubs from Canada diminished considerably, permits being issued for only 96, as compared with 174 the previous year. Nearly all were consigned to New Jersey. Fourteen polar bears were imported from Norway, 3 Indian bear cubs from Calcutta, 2 Himalayan bears, and 1 Malay bear.

Monkeys in considerable variety were brought in, the rhesus monkeys from India alone numbering 8,200. There were several interesting species, including chimpanzees, baboons, colobus monkeys, macaques, and bush monkeys from Africa and India; and ringtails, marmosets, and woolly and moss monkeys from Central America and South America. One orang-utan was entered from Singapore.

Among the more interesting mammals imported for zoological gardens were 1 maned wolf (*Chrysocyon jubata*) from Santos, Brazil, for the National Zoological Park, Washington, D. C.; and 1 aard-vark (*Orycteropus afro*) from South Africa, also for the National Zoological Park. Both are exceedingly rare in captivity.

PERMITS ISSUED UNDER MIGRATORY BIRD TREATY ACT

The regulations under the Migratory Bird Treaty Act provide for the issuance of permits to take, possess, buy, sell, exchange, and transport migratory waterfowl for propagation; and to take, possess, buy, sell, exchange, and transport migratory game and nongame birds for scientific purposes. The number of such permits outstanding at the close of the year, including permits issued during the year, was as follows: Scientific collecting, 2,350; scientific possession, including taxidermist, 574; special scientific possession, 1,624; bird banding, 1,874; and propagating (possession and sale), 4,398.

To take migratory waterfowl for propagation, 114 permits also were issued. Reports submitted by permit holders during the calendar year 1933 show 47,102 wild ducks raised in captivity, of which 45,422 were mallards and 879 black ducks, and the others mainly wood ducks, pintails, teals, gadwalls, canvasbacks, scaups, shovelers, baldpates, and readheads. The number of wild geese raised under permit was 4,166. Migratory birds propagated and reported sold during the year included 5,281 ducks and 251 geese for food, and 5,055 ducks and 1,742 geese for propagation.

OPERATIONS IN PREDATOR AND RODENT CONTROL

In many respects the fiscal year 1934 was the most turbulent and most unsatisfactory in the history of the Bureau's predatory-animal- and rodent-control operations. Federal expenditures were cut from \$547,499 in 1933 to \$418,304 in 1934; State expenditures from \$370,794 to \$248,044, and the cooperative funds of counties, livestock associations, and others from \$641,785 to \$615,082. Revenue for predatory-animal control, derived from State levies on livestock, had fallen off as much as 75 percent in 3 years because of the decrease in assessed valuations. The price of furs continued too low to attract the commercial trapper, and the burden of controlling predators was left to the entirely inadequate force of Federal and cooperating hunters. In spite of the excellent showing made by these hunters the previous year, predatory animals had increased alarmingly, and as their depredations on stock and game increased, so did the requests for assistance. Even the weather aggravated the situation, the extreme drought causing injurious rodents to concentrate on the greener cultivated crops, and both livestock and predators to gather around the comparatively few watering places.

For more than 20 years the Biological Survey has conducted an uphill fight to gain control over the rodents that have so greatly interfered with western farming and grazing. Slowly, but surely, they have been suppressed, until in recent years this major hazard has been reduced over large areas. The fecundity of the rodents is so great, however, that much of the advantage gained is lost by relaxation for even a single year. The threatened relin-

quishment of the hard-earned advantage was thus of the utmost concern, both to those responsible for local projects and to the cooperators who depend upon the Bureau for leadership. The resourcefulness and courage with which this situation is being met is a tribute to the character of the men engaged in the work. To compensate for decreased personnel, the trappers employed lengthened their trap lines, the rodent crews pushed their operations to the limit, and in many cases curtailed appropriations were offset by funds raised by stock associations. In Nevada, for example, following the elimination of the State appropriation of \$17,500 for predatory-animal control, the livestock associations were asked to pay half the salaries of the Federal hunters in their district and more cooperation was pledged on this basis than there were Bureau funds to match.

Fortunately, emergency funds were made available during the year, and in many cases these took the place of curtailed appropriations to the extent that in most districts rodent-control activities did not suffer and in others more progress was made than in any previous year. Although the emergency projects for predatory-animal control helped out materially wherever they were practicable, such emergency work cannot compare with the efficient accomplishments of the regularly employed hunters.

At the close of the fiscal year it was found that an all-time record had been made in the acreage treated for the control of field rodents (31,345,555 acres); and also in the extent of control operations directed against the house rat. Regardless of the reduced personnel, practically as many predatory animals were taken this year as in last year's record catch.

CONTROL WORK UNDER THE RECOVERY PROGRAM

Designed to give work to unemployed, the recovery program sought to meet the greatest public needs, and in many States programs of rodent and predator control were selected as major projects. Through emergency projects 10,758,072 acres of national forest, Indian reservations, and other lands were treated in the suppression of injurious rodents.

Rodent control fitted well into the recovery program, in that it provided employment for a large number of men without the necessity of expensive equipment and supplies, other than for bait materials. Furthermore, much of the bait used (1,748,873 pounds) in these emergency operations was prepared in the Bureau's bait-mixing station at Pocatello, Idaho. Efficient results have been obtained, largely due to the large corps of capable operators who had been developed in previous years and were thus available for supervisory positions.

CIVIL WORKS, FEDERAL EMERGENCY RELIEF, AND RECONSTRUCTION FINANCE CORPORATION PROJECTS

The largest emergency project conducted by the Bureau during the year was C. W. A. project F-17, "Rodent control in connection with typhus fever control." This was carried on in Georgia, Alabama, and Texas in cooperation with the United States Public Health Service and had as its prime objective the control of typhus fever. Fleas from infected rats transmitted the virus to other rodents and to man. To control the disease it was necessary to eliminate the rats.

Approximately 10,000 C. W. A. workers were employed in treating 747,608 premises in the 3 States. The use of more than 800,000 pounds of red-squill rat bait and 400,000 traps resulted in the destruction of at least 7,500,000 rats, at a total cost of \$672,962.82. It is still too early to know the ultimate effect of the campaign in the control of typhus fever. The number of typhus-fever cases had increased 300 percent in Alabama during 1932 and 1933, and in 1934 up to the conclusion of the rat-control campaign, and had the same ratio been maintained 630 cases would have been reported from the close of the campaign in March to July 1. Instead there were only 47 cases, or an indicated decrease of 93 percent. In Georgia and Texas a corresponding decrease in the number of cases also took place. The economic saving of produce and property in the 136 counties covered has been estimated to be approximately \$8,750,000.

A number of additional local C. W. A. campaigns for the control of rats were conducted—primarily in Texas, Mississippi, and New Jersey.

The C. W. A. program (continued after March 31 as F. E. R. A. work) was utilized in predatory-animal control operations in Arizona, Colorado, Montana, Utah, Oregon, Washington, and Wyoming. R. F. C. funds were made available in Texas for the control of predators. A total of \$85,310.47 was expended on these projects, accounting for 7,314 predatory animals.

PUBLIC WORKS PROJECTS

Of \$296,100 in P. W. A. funds allotted to the Bureau by the Forest Service for rodent control on national forests, \$185,700 had been expended by the end of the fiscal year and 4,453,138 acres of national forests had been treated for the control of prairie dogs, ground squirrels, kangaroo rats, pocket gophers, and porcupines. The bulk of this work was accomplished in Oregon, California, Idaho, Nevada, Arizona, Colorado, Wyoming, New Mexico, and Utah. The direct allotment of P. W. A. funds to the Bureau made it possible to carry on work that could not be reached by E. C. W. crews working out of C. C. C. camps. P. W. A. labor was also used to follow up E. C. W. work done last year and to treat extensive areas of forest preserves where previously work had not been possible. The cooperation of the Forest Service was of great assistance in the efficient expenditure of these funds.

EMERGENCY CONSERVATION PROJECTS

Labor from C. C. C. camps of the E. C. W. program was utilized on 5,682,230 acres of Indian reservations, forest preserves, and other public lands for the control of ground squirrels, prairie dogs, jack rabbits, pocket gophers, porcupines, and other rodents. Regular employees of the Bureau were transferred to the E. C. W. rolls as supervisors in many cases, and in other instances Forest Service officials in cooperation with Biological Survey leaders supervised the operations. Damage by pocket gophers, rabbits, porcupines, and other rodents to forest plantings made rodent control important in reforestation. Control of burrowing rodents also became a necessary adjunct to the erosion-control program. Under this program limited predatory-animal-control work also was conducted in New Mexico and South Dakota.

OTHER EMERGENCY PROJECTS

With \$15,000 of drought-relief funds set aside for rodent control, 368,844 acres were treated in Idaho. Other emergency funds were made available in small amounts, such as P. W. A. money for local projects in California counties and R. F. C. funds for predatory-animal control in Texas.

ECONOMIC BENEFITS FROM PREDATOR AND RODENT CONTROL

Increase in the numbers of predatory animals following the cessation of commercial fur trapping considerably augmented the losses from the predators this year. For instance, their destruction of sheep in Arizona has been estimated as 3 percent among the flocks on the ranges and 0.5 percent among calves. In Texas the State's estimate of loss is much lower, being 0.75 percent of sheep, 1 percent of goats, 0.5 percent of pigs, one-fortieth of 1 percent of cattle, 3 percent of chickens, and 7.7 percent of turkeys.

Because of the protection given bears in several States and because of a shortage of natural food, in places their depredations have been on the increase. As an example of the damage individuals can do when they become killers, one bear during the year killed 135 sheep in Mineral County, Colo., before being captured. It was found necessary to take 347 stock-killing bears during the year, as compared with 242 last year. In the entire 20 years of predatory-animal control the Bureau has taken only 3,464 bears throughout the United States, which is no more than the number that has been taken in a single year by hunters on the national forests alone.

The beneficial effect of predatory-animal control upon game conservation is becoming increasingly evident. Antelope in particular are increasing rapidly in localities where predator control is maintained. In Nevada, Oregon, and California their increase has been largely due to the protection afforded by Bureau hunters. In 1920 the antelope had reached a low ebb, but since the beginning of the control work in 1915 hunters stationed on and about their range in the present Charles Sheldon Wildlife Refuge have removed 2,991 coyotes

and bobcats from the area, and the approximately 200 antelope on this range at the beginning of the control program have increased to a herd numbering 1,000 to 1,500. In 1921 a hunter was stationed in the Mount Dome section of California to keep down the animals preying on the antelope, which at that time numbered less than 100. Since then 3,078 coyotes and bobcats have been removed from this range, and the herd has increased to about 900. In Oregon, on the Hart Mountain area, hunters have removed 1,526 coyotes and bobcats from the antelope range, and the herd ranging on this and adjoining areas has increased from a few hundred to between 3,500 and 4,000, and there has been a surprising increase in the number of mule deer on this area. That deer and turkeys also respond rapidly to protection is evidenced by a report from Texas that the numbers of these game species have at least doubled since predatory-animal-control work was begun there 6 years ago.

Although predators in general have increased during the past 2 years, they are scarce in comparison with the numbers prevailing before the Federal control work was instituted 20 years ago. The present maximum infestation is probably reached in southern Texas, where 12,920 coyotes, 2,567 bobcats, and 66 mountain lions have been taken in Webb County alone in 2½ years. The control of wolves has been satisfactorily maintained, and definite headway has been made in Michigan, Oklahoma, and Arkansas.

Estimates of the value of rodent control have been made by farmers and stockmen on whose lands the work has been accomplished, and the figures have been compiled by projects and counties by the Survey's district leaders. The total savings thus effected on 31,000,000 acres during the past year is estimated at \$6,878,000, exclusive of the savings resulting from rat control in the typhus-fever campaign, which is estimated to have been an additional \$8,750,000.

DISEASE CONTROL BY SUPPRESSION OF CARRIERS

No serious outbreaks of rabies in wild animals occurred during the year, Federal hunters in several States having suppressed sporadic outbreaks before they became wide-spread. Rabies among coyotes in Reeves and Culbertson Counties, Tex., caused the death of a number of cattle, bitten before the outbreak was brought under control by concentrating a number of hunters in the area. By capturing the last of the infected coyotes, a definite stop was put to the serious rabies epizootic that appeared in New Mexico during the last fiscal year.

A serious outbreak of bubonic plague among rodents in Modoc County, Calif., is indicated by positive determinations in more than 20 Oregon ground squirrels (*Citellus oregonus*) and 1 wood rat (*Neotoma cinerea occidentalis*). Arrangements are being made for control operations when the rodents emerge from hibernation next spring.

The death of more than 200 sheep near Ringling, Mont., resulted in an investigation by specialists of the State board of health, the Rocky Mountain Spotted Fever Laboratory, and the Bureau of Biological Survey, who definitely determined that tularemia was responsible, the infection having been transmitted from rabbits to the sheep by ticks. Examination of rabbits, which were dying in this vicinity, showed that they were infected with the disease. Losses stopped after the sheep were dipped and moved to a new range. The Biological Survey inaugurated a control campaign to reduce the number of rabbits.

CONTROL OF HOUSE RATS AND OTHER RODENTS

Operations for the control of house rats, other than in connection with the emergency program, were conducted in a number of Western States, particularly on the Pacific coast, and in Texas and States east of the Mississippi River. The number of rat-control campaigns, however, declined sharply from the number last year because the time of county agricultural agents was so fully taken up with the agricultural-adjustment program. In addition to the emergency work, 89 county and city rat campaigns were conducted in the East, utilizing 29,430 pounds of bait on 16,828 farms and other premises.

Red squill as developed by the Bureau is being used more widely each year for the control of house rats and is rapidly replacing more virulent and harmful raticides, thus reducing the menace of poison to human life and domestic animals. By means of a scholarship financed by the Massachusetts cooperative

rodent control fund, the second year of a study of red-squill extracts has been completed at the Massachusetts State College, and as a result red-squill extract is now being used as a follow-up to powdered red-squill baits.

In field-mouse control 52,647 pounds of bait were used. Many demonstrations also were made in the control of woodchucks, moles, cotton rats, and other rodent pests of purely local importance.

During the rush season it was found necessary to operate the Survey's bait-mixing station, at Pocatello, Idaho, daily on a 24-hour schedule in order to meet the needs of E. C. W., P. W. A., and F. E. R. A. rodent-control operations in addition to the regular work of the Bureau. As a result of capable management, 2,735,953 pounds of improved grain bait were prepared at this plant during the year and shipped to 25 States.

CONTROL-METHODS RESEARCH

Improvements in methods of controlling predatory animals and rodents were made at the control-methods research laboratory, at Denver, Colo., and at field stations. As there is a wide variation in food preferences of the same species in different localities and at different seasons, as well as great discrepancies in susceptibility to strychnine and other poisons, hundreds of combinations must be tested in the field in order to find the formula best adapted for a typical habitat. Seventy-seven processed strychnine formulas were prepared and tested this year. Several of these gave better results than the old standard formulas and were used to advantage in extensive field operations against prairie dogs and ground squirrels.

Other work at the Denver laboratory included 160 analyses and tests of stomach contents and of organs of animals accidentally poisoned, and toxicological and chemical tests of commercial poisons.

Seasonal food preferences of pocket gophers were studied in California, Oregon, and Arizona. New poisons are constantly being studied, and the most promising are given comparative field tests. Zinc phosphide has been found most toxic to wood rats, a species highly resistant to strychnine.

Though the relation of rodents to reforestation problems has long been studied, the tremendous increase in tree planting under E. C. W. necessitated intensive research to develop methods for the protection of seedlings from mice, ground squirrels, rabbits, and other rodents. Bureau workers successfully developed a formula and method of application for attacking the problem, and control operations were well started before seed planting was undertaken. On the unpoisoned areas a great deal of damage was done by mice, while on the treated areas, there was relatively little injury. No clipping damage of any consequence has occurred to the seedlings since they have sprouted.

In the Northwest and in the Lakes States region, extensive work has also been done on methods of controlling snowshoe rabbits as they affect the tree-planting program, and satisfactory progress toward control on these areas has been made.

REPORT OF THE CHIEF OF THE BUREAU OF CHEMISTRY AND SOILS, 1934

UNITED STATES DEPARTMENT OF AGRICULTURE,
BUREAU OF CHEMISTRY AND SOILS,
Washington, D.C., August 31, 1934.

SIR: I present herewith the report of the Bureau of Chemistry and Soils for the fiscal year ended June 30, 1934.

HENRY G. KNIGHT, *Chief.*

Hon. HENRY A. WALLACE,
Secretary of Agriculture.

INTRODUCTION

The practical and scientific value of the activities of the Bureau of Chemistry and Soils has been emphasized during the past fiscal year by important contributions which the Bureau has made to the recovery program when called upon to aid and supplement the work of the Agricultural Adjustment Administration and other recovery agencies of the Government.

The importance of the research and fact finding of the Bureau as they relate to the plant-food researches of the Nation, to the economic utilization of soils, to the development of crop resources, and to the utilization of crop wastes and surpluses by manufacturing industries has been demonstrated by the tying-in of the Bureau's activities and trained personnel at many points with the Department of Agriculture's aggressive program to bring the farmer to economic parity with those engaged in other branches of American industry.

With the object of assisting American farmers to more economical and profitable crop production, the Bureau is engaged in perfecting a Nation-wide inventory of the soil-fertility resources of the United States whereby the Federal Government, the States, and individual farmers will be enabled to develop more efficient and profitable agriculture by the proper adaptation of crops to soils. Another important aid to more economical and profitable crop production is the constant research of the Bureau directed to perfecting and cheapening methods of fertilizer manufacture and fertilizer application. The problem of profitable utilization of farm byproducts and farm refuse is one on which the Bureau is constantly engaged. The object of much of its research work is the widening and improvement of markets for farm byproducts, surpluses, and refuse, by demonstrating their value as sources of raw material for industry, and consequently, as sources of increased income for the farmer.

The Bureau's research work in the past year has included investigations in soil chemistry, soil physics, soil erosion, soil microbiology, soil fertility, nitrogen fixation, potash and phosphate resources, crop chemistry, fruit and vegetable chemistry, fermentation methods for the production of organic acids, the utilization of farm and industrial wastes, food microbiology, food deterioration and spoilage, dust explosions, and farm fires, and improvements in the technic of producing sirups, sugars, vegetable oils, proteins, insecticides, fungicides, tanning materials, and a variety of other products.

For administrative purposes the various activities of the Bureau are organized under three large units—(1) Chemical and Technological Research, (2) Soil Investigations, and (3) Fertilizer Investigations. Probably the most striking development of the past fiscal year has been the demand made upon each of these three units for aid to the various emergency and relief activities of the Government.

The principal activities and objectives of the three units of the Bureau are discussed briefly below with particular reference to those phases of the work which are supplementing the program of the Agricultural Adjustment Administration. A more detailed and comprehensive account of the Bureau's work for the past year is given in the remainder of this report.

CHEMICAL AND TECHNOLOGICAL RESEARCH

The chemical and technological research work of the Bureau supplements in many ways the program of the Agricultural Adjustment Administration, as well as the measures which are being taken by other economic and relief agencies.

A very important line of research is the devising of means for more profitable utilization of surplus, cull, and off-grade fruits and vegetables, together with farm waste materials such as straw, stalks, hulls, and other so-called "agricultural wastes." This work supplies the second step in the control of agricultural production which is required to complete the scheme of properly adjusted production and consumption of farm crops. This second step is the complete and intensive utilization of all that is produced on controlled acreage so as to afford the farmer a maximum return for his crops.

Profitable byproducts utilization of surplus, cull, and off-grade fruits and vegetables serves to support the market grades and makes it possible to obtain a greater degree of flexibility in marketing. Thus, in years of relatively large production more of any given crop may be diverted into byproducts, whereas in periods of underproduction it will be profitable to sell a greater proportion through the usual market channels.

Such byproducts industries serve as a balance wheel to control market supplies. This principle is well illustrated by the domestic citrus byproducts industry which was developed as a result of research by this Bureau and which is now the world's largest producer of lemon oil, orange oil, and citrus pectin. More profitable means of utilizing surplus, cull, and off-grade fruits and vegetables, and farm wastes of various types is particularly important because the cost of producing such material has already been incurred, and increase in income derived by the farmer from more effective utilization is clear profit.

A more recent development in this field is the devising of a process for profitable production of high-grade starch from cull sweetpotatoes which constitute a large proportion of the field-run crop and which have heretofore been very poorly and inefficiently utilized. A commercial sweetpotato-starch industry is now being established as a result of this work. In addition, the Federal Emergency Relief Administration is financing a sweetpotato-starch factory as a part of its program for providing employment. The sweetpotato starch so produced is not competitive with cornstarch but will be used to replace imported potato starch.

Other work of a chemical and technological research nature is resulting in new uses for existing crops and in the introduction of new crops to provide products for which uses have been found recently. Thus, for instance, means have been devised for greater utilization of chicory, which is now a minor crop, and certain insecticidal plants which may serve as important crops have been introduced for the purpose of supplying insecticides of new types. Work of this kind is in the interest of greater crop diversification and makes possible increasing flexibility in agricultural-adjustment measures.

Farm income from certain crops can be increased in some cases by better adaptation to market requirements and preferences, particularly in the case of derived products which do not bring the highest market price because of inadequate quality and which thus react against the value of the primary commodity. An illustration of this is the improvement being effected in the production and marketing of turpentine and rosin with increased return to turpentine farmers. An efficient naval-stores industry is essential to successful yellow-pine reforestation which is of great importance to certain sections of the South.

Another illustration of the value of work of this type is the recent improvement in the quality of farm-made sorgho and sugarcane sirups. During recent years there has been a spread of as much as 300 percent in farm price between high- and low-grade sirups, depending on quality. High-grade sirup can be sold direct to the final consumer at maximum price, whereas low-grade sirup is usually sold under distress conditions at an unremunerative price.

The losses to the food industries of the Nation as a result of decay, fermentation, rancidity, staling, discoloration, and other deterioration changes amount to several hundred million dollars annually. Work has been directed to the

study of methods for reducing these losses which are due to the action of micro-organisms, enzymes, oxidation, light, heat, and other causes. This work is of particular value under present conditions because of decrease in some food supplies as a result of the drought.

The "fire tax" resulting from damage by farm fires amounts annually to an average of \$16 per farm for the entire United States. Research is bringing about a material reduction in this tax as well as a reduction in the dust-explosion hazards and losses to which country grain elevators and various industries for processing agricultural products are exposed.

Considerable stress has been placed by the Bureau on insecticide research. Obviously we should not allow the insects to control crop production. Work of this kind is an important factor in any program for agricultural adjustment and production control, since it places this control on a more calculable basis. The research is resulting in the production of new insecticides which are effective against certain insects and yet are harmless to man. The effectiveness of insecticides in general is being increased, and the quantity of toxic residues adhering to sprayed fruit is being further reduced.

SOIL INVESTIGATIONS

It is hardly necessary at this time to stress the importance of soil-erosion research. The serious character of the soil-erosion situation is now well recognized by the public generally. Millions of acres of our best agricultural lands have been destroyed, even greater areas have been injured in varying degrees, and tremendous damage has been done to our natural and artificial water-storage reservoirs, to stream channels and drainage lines of every type, as well as to lower lying areas of land which are subject to invasion by erosional debris and to flood water released from higher levels.

In view of the serious drought of the present year, it is desirable to stress the water-conservation phase of the soil-erosion research program. The drought has appeared as a largely unpredictable and at present uncontrolled factor in the program of agricultural adjustment. In addition to adjustment measures that are now in force and under consideration for the purpose of effecting economic compensation for inadequate agricultural production in certain areas in drought years, it is important to observe that the effects of drought may be alleviated to an appreciable extent by increasing soil absorption of rainfall and decreasing water run-off through soil-erosion control measures. From this standpoint the program may well be termed a soil-erosion control and water-conservation measure. In other years and under other conditions it may be regarded as a soil-erosion and flood-control measure.

The control of soil and water losses still centers largely in the erosion-experiment stations located in 10 of the most seriously affected type areas of the country. These stations are well distributed and serve an aggregate area of more than 225,000,000 acres. They have contributed much constructive information not only to the public at large but also to various service organizations for direct application in the field and for systematic extension activities for the purpose of placing this information in the hands of farmers as rapidly as possible. Although striking results have been obtained in the control of soil and water losses through the proper use of vegetation and by terracing and other mechanical means in a more or less independent way, it now appears that a combination of these corrective measures may prove more advantageous and effective, particularly since complete dependence is not placed on any one measure over any considerable period.

The importance of soil-survey reports in any scheme of agricultural control is self-apparent. No intelligent action with respect to use of land, the basis of agricultural production, can be made without adequate soil-survey information. An effort has been made to extend the work of the soil survey in directions where it will meet to the greatest possible extent the increased demands made upon it by various recovery and relief organizations.

The maps and reports of the soil survey are being used extensively by those organizations which have such responsibilities as the determination of land use, the zoning of rural lands, appraisal of farm lands, purchase of lands for farms or forests, and the location of reclamation projects. In fact, the published maps and reports of the soil survey, together with special reports, provide the foundation of the majority of the present activities relating to land use.

In the selection of sites for subsistence homesteads, it is of the utmost importance that the land selected be of sufficient productivity to maintain an organization of the type planned. In recognition of this fact the soil maps have been freely used in the selection of such areas, and proposed lands are carefully examined by trained soil scientists familiar with soil-survey methods and with the characteristics and capabilities of the various soil types. Such a procedure assures the home seeker that the land will do its part.

The Division of Program Planning of the Agricultural Adjustment Administration is now developing a series of projects for the planning of land use in sample areas. For such a program the first essential is an accurate inventory of the land resources of the area. Maps showing the distribution of the various soil types and their individual possibilities for the growing of crops, grasses, and forests constitute the essential groundwork for these plans. If poor crop lands are to be abandoned, one must know what soil types are unsuited for crops and where these are located and also what lands unsuited to crop production can be used for grazing or for forestry. Once the soil types of these areas have been determined, sufficient information is available for the initial stage of such undertakings.

It is desirable in an agricultural adjustment program that cultivated land be used for the specific crops for which it is best suited, subject, of course, to required crop rotation and control of total production in relation to consumption demands. Application of this principle is an important factor in reducing unit-production cost. Knowledge of inherent soil fertility and the relative suitability of various soil types to specific crops is indispensable for the purpose of determining whether the use of fertilizer is profitable and, if so, the kind and amount of fertilizer which may be used with profit.

It is also important that soil fertility be kept at a proper level through attention to those factors which make for proper maintenance, adequate drainage, control and adjustment of soil reaction, and the adaptation of acid-tolerant crops to soils of varying acid reaction. We must conserve the humus supply of the soil and extend our knowledge of the use of fertilizers for plant-feeding purposes, including a knowledge of the functions of the less common soil elements which, while present in comparatively small amounts, are of extreme importance in the maintenance of soil fertility. The function of certain less common elements, such as manganese, magnesium, and zinc, in promoting plant growth and in influencing crop quality is an important subject for research. Marketability and crop value have been materially increased by applying information so obtained to various crops, particularly to certain fruits and vegetables.

In addition to the direct influence of fertilizers in reducing production costs and improving quality, it is becoming more evident that the efficient use of fertilizers is an important factor in promoting a more favorable development of soil-improvement crops. In order to obtain effective results in this direction, steps must be taken to coordinate modern fertilizer materials and their mixtures with soil conditions, with special attention to soil and fertilizer reactions.

The Bureau is conducting on important soil types a wide range of soil-fertility investigations dealing with the soil-fertility and fertilizer requirements of leading crops. These studies deal, in the major part, with the usual plant-food requirements and, in addition, with certain less common plant-food elements: also, with organic-matter supplies and with the relation of soil-fertility factors to malnutrition of different crops. All of this work is in the interest of a more efficient agriculture with lower production costs and will result in placing production on a more calculable basis, thus facilitating agricultural planning and adjustment.

FERTILIZER INVESTIGATIONS

The fertilizer investigational work of the Bureau embraces those activities which aim at the most economical utilization of this country's resources of the main plant-food elements—nitrogen, potassium, and phosphorus. The conversion of these natural resources into improved fertilizer materials, the preparation of fertilizer mixtures which promote crop growth without increasing soil acidity with resultant injury to crops of subsequent years, the production and study of the properties of new fertilizer compounds with special reference to their use in mixed fertilizers and the need for minor elements are but a few of the lines of research covered.

The importance of fertilizers to the farmer is attested by an increase in consumption of commercial fertilizers in this country from 4,361,795 tons in 1932 to 4,818,811 tons in 1933, whereas the acreages of the four crops to which fertilizers are mainly applied decreased from 35,939,000 to 30,144,000 in the case of cotton, from 108,668,000 to 102,239,000 for corn, from 3,381,000 to 3,184,000 in the case of potatoes, and from 57,204,000 to 47,493,000 for wheat. About 75 percent of the fertilizers consumed in this country are used on these four crops.

The program of fertilizer investigations fostered and carried out by the Bureau for the past 20 years has resulted in a nitrogen industry adequate to meet the country's requirements for peace-time industry and for national defense, a domestic potash industry which guarantees against future shortage and foreign monopoly, improved phosphate and mixed-fertilizer production, and an annual saving to the American farmer of over \$30,000,000.

An idea of the extent to which the farmer has profited as a result of reduced costs of fertilizers, due mainly to improvements in known methods for the production of fertilizer materials as well as to the introduction of new fertilizer materials obtained by cheaper manufacturing processes, and their competition with already established materials, may be gained from a comparison of the costs per unit of 20 pounds of plant food in various materials at producing points in the years 1920, 1925, 1930, and 1933, shown in table 1.

TABLE 1.—*Cost per unit of 20 pounds of plant food in various materials in selected years*

Material	Plant food	1920	1925	1930	1933
Sodium nitrate.....	Nitrogen.....	\$4.44	\$3.28	\$2.49	\$1.53
Ammonium sulphate.....	do.....	4.08	2.65	1.79	1.12
Anhydrous ammonia.....	do.....		1 1.75	1.40	1.15
Cyanamid.....	do.....	3.40	2.20	1.65	1.13
Animal tankage.....	do.....	8.38	3.98	3.78	2.02
Fish scrap.....	do.....	8.02	5.33	4.95	2.88
Dried blood.....	do.....	8.97	4.53	4.27	2.63
Cottonseed meal.....	do.....	9.48	5.69	5.01	2.71
Run-of-pile superphosphate.....	Phosphoric acid.....	1.22	.57	.54	.43
Potassium chloride.....	Potash.....	2.41	.68	.69	.70

¹ Cost in 1926.

The steadiness of the price of potash during the past 10 years has been due to the influence of European producers who have heretofore dominated the market. That the American potash industry has become so firmly established as to free this country permanently from foreign monopolistic control, however, has been demonstrated by its initiation this year of a series of price reductions which have brought the cost of muriate of potash to the lowest price at which it has ever been quoted in this country, namely 35.2 cents per unit of potash.

With a realization of the fact that there is a final limit to the economies to be attained by process improvements, the Bureau is giving increased consideration to the economies which accrue from improvements in the physical form of fertilizers, the elimination of fillers, and the production of physiologically neutral fertilizer mixtures.

ASSISTANCE TO EMERGENCY AGENCIES OF THE GOVERNMENT

An adequate evaluation of the extent to which the Bureau of Chemistry and Soils has aided and supplemented the program of the Agricultural Adjustment Administration and other recovery agencies of the Government can hardly be had from a general discussion. For this reason a brief summary of the specific activities with which the Bureau is aiding the recovery program is given herewith.

RESEARCH ON NEW INSECTICIDES THAT ARE NONPOISONOUS TO MAN

Under an allotment of \$60,000 from Public Works Administration funds, the Bureau is conducting research both in its Insecticide Division and its Food Research Division in an endeavor to find new insecticidal uses and better

methods of utilizing nicotine, pyrethrins, rotenone, oils, and other insecticides, especially those nonpoisonous to man, including studies to determine the toxicity of insecticidal products.

The allotment for this work was made available for use only this spring, but the staff has been assembled and the work is thoroughly organized and actively under way. Scientists are now actively at work on these problems not only in the laboratories here in Washington and in laboratories of the Bureau in San Francisco, Calif., and in Richmond, Va., but also in the field in the fruit-growing sections of the country.

INVESTIGATIONS OF ALKALI-DISEASE PRODUCING AREAS

An allotment of \$35,000 was made available by presidential order dated September 5, 1933, from Emergency Conservation Work funds for investigations by this Bureau in connection with alkali-disease producing areas for the purpose of ascertaining the extent of lands containing sufficient selenium in the soil to render vegetation toxic to animals. Work was begun at once along three lines: (1) Explorations to ascertain the relative selenium content along transects in areas suspected of containing selenium; (2) a soil geological study of the materials presumably the source of the selenium in the soil; and (3) development of adequately accurate and rapid methods of examination of samples of soil, vegetation, and minerals, together with the application of these methods to samples collected in the course of the field studies.

DEVELOPMENT OF NEW SWEETPOTATO-STARCH INDUSTRY

Directly as a result of research by the Bureau, which devised and established a method for producing high-grade starch from sweetpotatoes for which an excellent market is indicated, the Federal Emergency Relief Administration has made available to the Mississippi Emergency Relief Administration \$172,000 for the construction and operation of a sweetpotato-starch plant at Laurel, Miss., this project being conducted in association with the Subsistence Homesteads Division. Relatively small factories (to reduce transportation cost of raw materials) of about 2 million pounds annual production of starch are contemplated, and the prospective market for sweetpotato starch would absorb the output of about 25 factories of this size, making possible the direct employment of 6,500 heads of families.

The factory at Laurel is now in the course of establishment under the direction of a scientist from the Bureau, and, under a cooperative arrangement with the Mississippi State Emergency Relief Administration and the Mississippi State College of Agriculture, the Bureau will engage in active research in connection with this problem.

Sweetpotato starch can be produced at a competitive cost and should gradually displace the imported product.

SOIL SURVEY OF PUERTO RICO

Under an allotment of \$35,000 from the sugar-processing tax of the A.A.A., the Bureau is to undertake the immediate mapping and classifying of the soils of the interior of the island of Puerto Rico. This work is to be undertaken under a cooperative agreement between the Department of Agriculture and the Puerto Rico Policy Commission. This survey has been urged as an emergency project by that commission in order that the best use may be made of all lands on the island available for crop production, and as a result of these studies it is expected that there can be marked out on the higher lands those areas that can be profitably utilized. Work has not been started on this project, as the funds will not be available until returns are had from the sugar-processing tax which became effective on July 8.

SOIL-EROSION SURVEY AND EROSION-CONTROL INVESTIGATIONS IN PUERTO RICO

Under an allotment of \$207,000 from the sugar-processing tax of the A.A.A., the Bureau is to undertake an immediate erosion survey in the island of Puerto Rico for the purpose of establishing a comprehensive program of erosion-control investigations. This work is to be undertaken under a cooperative agreement between the Department of Agriculture, Puerto Rico Policy Commission, and the University of Puerto Rico. The program is a well-defined outgrowth of the present concern that is felt by those in authority over conditions of land denudation that are developing in certain sections of

the island. The work referred to is scheduled to cover a period of 3 years, beginning at such time as funds are actually made available through the sugar-processing tax upon which it has been established.

LAND INVENTORY OF THE UNITED STATES

At the request of the National Resources Board, the Bureau is undertaking the immediate preparation of an inventory of the lands of the United States based on the character of the soil and climate, the inherent productivity of the soil, and the relief of the land in the various parts of the country, involving the application of an evaluation in terms of relative productivity of the various soil types to each locality. This work will be carried on through the assignment of a number of experienced scientists in soil survey, and their work will be based upon the data accumulated by the Bureau over the past 30 years in its survey and mapping of the soils of the country. This work is just being inaugurated under an agreement whereby the National Resources Board will undertake to finance this study. As the Board desires to use this material for its report to the President, the studies will be completed within 2 months.

SOIL SURVEYS AS A BASIS FOR LAND CLASSIFICATION

At the request of the State Planning Council of Washington, the Bureau has assigned 6 of its experienced soil scientists to make a detailed soil survey of 8 counties in that State, this survey to serve as a basis for land classification and determination of land use. For this project the State planning council has made available a fund of nearly \$100,000, 50 percent of which it is understood is from Federal funds. The scientists of this Bureau will furnish the basic information on the soil types in terms of their inherent fertility, slope, location, etc. The ultimate objective is classification of land according to the use for which it is best adapted—agriculture, forestry, recreation, industrial and urban sites, etc. The Bureau's scientists will be assisted by a number of trained workers assigned by the State.

SOIL-EROSION CONTROL

While this is an emergency activity of the Department of the Interior where the Soil Erosion Service has been established as a division under allotment of P.W.A. funds, its work is based on the results of the investigations and experimental work inaugurated in the Department of Agriculture under the Bureau of Chemistry and Soils and the Bureau of Agricultural Engineering. In fact, the Director of the Soil Erosion Service is a member of the staff of the Bureau of Chemistry and Soils under administrative furlough from this Department to the Department of the Interior to organize and direct erosion control of important watersheds. In addition, the Bureau has loaned under administrative furlough to the Soil Erosion Service a number of its soil scientists to take over key positions in this emergency activity. Fundamental research on the problem of soil erosion continues as the function of the Department of Agriculture and is being actively and aggressively carried on.

Also, members of the Bureau's staff are now assigned to Emergency Conservation units to assist with erosion-control problems as they relate to Civilian Conservation Corps camps.

SUBSISTENCE HOMESTEADS

In the selection of suitably fertile lands that could be adapted properly to the types of farming required in areas under consideration by the Subsistence Homesteads Division (financed under allotment from the Public Works Administration), the Division has had the active assistance of this Bureau. Several of the leading scientists in soil survey of the Bureau have been assigned to this work on the request of the Division. In this work, the scientists of the soil survey have mapped and reported on a number of sites under consideration by the Division in Alabama, Pennsylvania, West Virginia, Tennessee, North Carolina, Mississippi, and Florida.

WORK ON NICOTINE FOR CODLING-MOTH CONTROL

The A.A.A. assigned \$1,200 to the Bureau of Chemistry and Soils for research on nicotine sprays for the purpose of improving the insecticidal power

of nicotine as a means of combating the codling moth, and under this allotment, a chemist was employed for 6 months during the past fiscal year.

As a result of these studies the Bureau has shown that nicotine combines with bentonite so as to permit the preparation of nicotine-bentonite with considerably greater nicotine content than heretofore used. This is an important contribution, as nicotine-bentonite has been shown by entomologists to be a promising insecticide for codling-moth control. In these studies the permanence of deposits from various nicotine sprays was investigated. It was also demonstrated that Florida peat absorbs nicotine to produce an insoluble compound, and the conditions governing the preparation of this material having been worked out, a patent is being applied for.

FERTILIZER INVESTIGATIONS OF THE TENNESSEE VALLEY AUTHORITY

The Bureau has assisted the Tennessee Valley Authority in its development of a fertilizer program through assignment to the Authority of several scientists of the Bureau engaged in studies on the development of concentrated phosphoric acid, and in addition, the experimental blast furnace of the Bureau was also made available to the Authority.

ASSISTANCE TO THE AGRICULTURAL ADJUSTMENT ADMINISTRATION AND THE FEDERAL EMERGENCY RELIEF ADMINISTRATION IN THE UTILIZATION OF HIDES

The Bureau has been called upon by the A.A.A. for advisory service in the handling of hides from the cattle-killing program of the Government. The hides experts of the Bureau have also supplied the Federal Emergency Relief Administration with tentative working procedures and schedules whereby hides from the cattle-killing program might be handled to provide relief employment and leather for relief and distress purposes.

ASSISTANCE TO THE A.A.A. ON NAVAL STORES MATTERS

The Bureau has been called upon by the A.A.A. for assistance and advice in formulating codes for the naval stores industry and supplying statistical information.

ASSISTANCE TO THE A.A.A. ON SUGAR-PRODUCTION CONTROL

The Bureau has at the request of the A.A.A. assigned certain of its specialists in sugar to assist in matters concerned with sugar production.

CONSTRUCTION PROJECTS UNDER ALLOTMENT OF PUBLIC WORKS ADMINISTRATION FUNDS

CONSTRUCTION OF AN AGRICULTURAL BYPRODUCTS LABORATORY

For the purpose of effecting better utilization of waste material from farm crops, an allotment of \$70,000 was made to the Bureau from P.W.A. funds for the construction of an agricultural byproducts laboratory at Ames, Iowa. More than 260,000,000 tons of straw and stalks are going to waste annually on American farms. The United States uses more than 11,000,000 tons of paper and paper board annually and imports the raw materials or the finished paper and board for more than half of this amount. This building now under construction will make it possible to adequately carry on investigations in the use of farm byproducts in the making of a large percentage of paper and board now used in this country. This will provide a market not now existing for part of these byproducts, as well as furnish additional employment.

CONSTRUCTION OF LABORATORY AND OFFICE BUILDING AT THE NAVAL STORES STATION, OLUSTEE, FLA.

For the purpose of providing needed facilities for the conduct of experimental work on the development and introduction of new and better methods of producing turpentine and rosin, to eliminate waste, make better and more useful products, and increase returns to naval stores producers (which work is provided for in the regular appropriations of the Bureau), an allotment of \$21,000 was made from P.W.A. funds for the construction of a fireproof chemical laboratory and office building at the naval stores station, Olustee, Fla.

OTHER CONSTRUCTION PROJECTS

In addition to the two major construction projects being conducted under allotment of P.W.A. funds, the Bureau was allotted \$12,919 for 14 smaller construction projects. These smaller projects have been carried on at Olustee, Fla.; Houma, La.; Columbia, S.C.; Weslaco, Tex.; and Arlington Experiment Farm, Va., and have provided necessary physical improvements to facilitate the research of the Bureau at the several stations. These projects provided considerable employment and have been entirely completed, the last having been finished June 13.

CIVIL WORKS ADMINISTRATION PROJECT—WORK AT EXPERIMENTAL STATIONS

An original allotment of \$239,627.60 of C.W.A. funds was made to this Bureau under the title "work at experimental stations." Two major types of work were undertaken: The construction of plane-table base maps of selected counties in 12 southern States; and maintenance and general assistance at the Bureau's several field stations and the Washington laboratories and offices. The plane-table base map work was to provide base maps to be available for later use in making soil surveys in the areas covered, and the work at the field stations consisted principally in the physical repair and improvements to facilitate the research work.

Surveys were conducted in 44 counties, and the maps constructed will be useful for the purpose intended. At the Bureau's field stations the repairs and improvements were carried out as planned, and the research work has been definitely facilitated. Over 800 persons were given employment throughout the country through the C.W.A. project of the Bureau.

CHEMICAL AND TECHNOLOGICAL RESEARCH

CARBOHYDRATE INVESTIGATIONS

SUGARCANE

Investigation was continued for the purpose of devising improved and practicable methods of juice clarification, particularly in the case of sugarcane varieties that yield well in cane and sugar per acre, but which yield juice of poor quality or difficult workability in the plantation sugarhouse. Improvements in clarification and handling of cane juice of poor "working quality" are necessary in order to obtain a satisfactory yield of sugar of suitable quality per ton of cane.

During the past season, large quantities of cane juice were treated experimentally by different methods and were made into comparable lots of sugar on a small scale by standard methods. All intermediate and final products were analyzed. The use of various tannins in conjunction with milk of lime and sulphur dioxide and lime was given particular attention during the season's work. Whole mill juice from a large factory was utilized in these experiments. Use of certain tannins yielded clarified juice and evaporator sirup of greatly improved color and clarity and likewise sugar of considerably lower turbidity, although the results were not conclusive with respect to the color of the sugar.

Many samples of cane were handled by the Bureau of Chemistry and Soils mill, which is provided with hydraulics to insure uniform pressure on the rolls, and comparable extraction data were obtained. The samples included the most promising of the newer varieties as follows: C.P. 807, Co. 290, Co. 281, 28/19, and 28/11, and in addition, from the experiment station only, 29/291 and 29/320. The chemical work included the analysis of the juice for sucrose, invert sugar, ash, composition of the ash, and organic nonsugars. The juice samples were clarified by a standard procedure, evaporated to sirup density, again analyzed, boiled to sugar, and the quality of the sugar determined by analytical methods.

The chemical work at the Houma field station is being conducted in such a manner as to supply the necessary advance information regarding the table sirup and sugar-making characteristics of the newer varieties of sugarcane before they are released for commercial cultivation, and the effects of different soil types, until investigation has included a wider range of cultural factors.

INVESTIGATION OF THE DETERIORATION OF SUGARCANE AT HARVESTING TIME

Lost time in the fields and in plantation sugarhouse operation, due to rains in the continental United States, has been estimated as 15 percent of the total time, or approximately 11 days out of the usual 75-day season required for harvesting and handling the sugarcane crop. It has been estimated that the avoidance of these delays would be worth at least 75 cents per ton of cane handled.

This investigation is being made in cooperation with the Bureau of Plant Industry at the Houma, La., station and has for its purpose the development of methods for storing cane in sufficient quantity, and without appreciable deterioration, to enable the plantation sugarhouse to operate more continuously, thus reducing net costs.

In studying such fundamental factors as temperature and humidity, use was made of a specially constructed storage house consisting of six rooms, individually controlled. All varieties of cane stored under high humidity conditions showed good keeping quality, with temperature playing only a minor part. These findings emphasize the necessity for transferring harvested cane as rapidly as possible, after being cut, to storage piles where it may be sprinkled. That sprinkling is a practical method of preventing evaporation of moisture from cane so as to retard deterioration was proved by many small-scale tests ($\frac{1}{2}$ ton to 70 tons of cane) and by larger tests, in which piles of 270 tons of cane were kept for 10 days without appreciable deterioration. Since large piles of cane serve as a good insulation against evaporation, only the surface cane needs to be sprinkled after the pile is saturated.

Co. 290 variety was quite resistant to deterioration, but less so than Co. 281, which is the most resistant variety now grown in Louisiana. Preliminary tests showed C.P. 28/19 to be quite resistant, and about equal to Co. 290, whereas C.P. 28/11 showed rapid deterioration under adverse conditions and may possibly be grouped with P.O.J.36M and C.P. 807, which are the least resistant of the present commercial varieties.

A method was developed for determination of invertase in sugarcane and a number of tests were made.

SUGARCANE SIRUP

The combined use of decolorizing carbon and invertase is a simpler and more practical procedure for farm-scale sirup making than were the older methods originally developed by the Carbohydrate Division. Additional improvements were made for the purpose of adapting these methods to farm sirup-making equipment of various types. Circulars describing this method were widely distributed to meet demands of sirup makers for information on the subject.

The production of "specialties" from sugarcane was studied with particular reference to La Cuite. The methods of juice clarification and treatment of the product to prevent crystallization as developed by this Division were employed in cooperation with a progressive sirup maker. The entire output of this specialty product was readily marketed at a good price and the cooperator plans for a much larger production during next year. It is anticipated that this improved product will afford a profitable market for considerable quantities of sugarcane.

Experimental work was continued for the purpose of studying the sirup-making properties of the newer varieties of sugarcane. The tests of cane varieties are being supplemented by an investigation of methods of clarification which are particularly suitable to different varieties in order to improve the quality of sirup of medium, or poor, quality which is made from canes of otherwise desirable characteristics.

SORGO SIRUP

Investigation of improvements in methods for making sirup of excellent quality on the farm was continued during the year. Particular attention was given to field work, actually on the farm, in cooperation with small-scale sirup producers. In developing new methods, previously reported, experimental work was planned to yield information regarding the most practicable and efficient details of procedure from a farm-operating standpoint.

The results of this work furnish good comparison of the practical value of the recently developed malt diastase, milk of lime, and decolorizing carbon treatments, not only when used separately, but also when used jointly, and in various combinations during the process of sirup making. Use of milk of lime

and malt diastase, according to the procedure described, gave greater improvement in sirup quality than was obtained by the use of decolorizing carbon alone. Preliminary work of considerable promise was done on a new method of applying malt diastase.

There are many varieties of sorgo (sweet sorghum) which vary greatly in suitability for sirup production. A study of the sirup-making properties of several different varieties of sorgo was conducted during the last season, in cooperation with the Mississippi Agricultural Experiment Station.

HONEY

A method of clarifying honey based on flocculation of the colloidal matter with the colloidal clay bentonite, with resulting production of brilliantly clear honey, has been devised. It was found, however, that a certain loss of flavor accompanied this treatment. This loss in flavor is due to adsorption of flavoring compounds by the bentonite, which is of gelatinous consistency, and also to loss during reconcentration of the diluted honey after clarification.

The use of filtration alone for clarification of honey at original density has been investigated, and a method has been developed that does not result in loss of flavor as in the case of the bentonite method. The honey is filtered under pressure at original density with the aid of a rapid filtering diatomaceous earth filter aid, using standard filtration equipment such as a plate and frame filter press.

The filtration process which has been developed by this Division provides a rapid and improved method of processing honey with no loss or change in flavor, in addition to obtaining a degree of clarity never attained heretofore in the honey industry. Better control of granulation is obtained by heating to a relatively high temperature for a short period than by using lower temperatures for longer periods. It is considered probable that the small amount of equipment required for this process will entail little additional cost for its adoption to replace the customary methods of heating and processing. In addition to retarding granulation, the method will yield honey of excellent clarity, with resulting added attractiveness to the consumer and stimulation of market for honey, with resultant benefit to producers.

UTILIZATION OF WHEY

The largest present source of loss in the dairy industry is the waste of sweet and sour whey. Approximately 4,000,000,000 pounds of sweet whey and 1,500,000,000 pounds of sour whey are produced annually by the domestic dairy industry. In addition to casein, which is now utilized, the principal valuable constituent of whey is milk sugar. On a basis of 60 percent recovery, approximately 165,000,000 pounds of milk sugar could be produced annually in the United States, as compared with only about 9,000,000 pounds produced in 1930 (principally for use in pharmacy).

Investigation was made of methods of production, manipulation, and properties of various products of a fondantlike nature which were prepared from lactose, derived from whey. Difficulty had been encountered in obtaining the desired consistency of the product under different desired conditions, and particular attention was given to this factor. Since consistency is determined to a great extent by the proportion of crystalline lactose in relation to proportion and density of sirup intimately mixed therewith, a study was made of the solubility of lactose in mixture with other sugars and the influence of various factors on rate of crystallization and size of crystals produced. Products were developed which were satisfactory for certain commercial purposes. This work is being done in cooperation with the Bureau of Dairy Industry.

SUGAR BEETS

The results of the analysis of samples of beet sugar selected over a period of several years from factories in all the different areas of the country in which sugar beets are grown show that as a result, in large measure, of the work done by this Division in cooperation with the industry, the quality of beet sugar produced has been steadily improving and is becoming more uniform in character.

Investigation of the location of the nonsugar substances in the sugar crystal has shown that the largest proportion of these substances is in the surface layer and that further improvement in the uniformity of quality of the sugar is

possible, not only by increase in elimination of the detrimental nonsugars from the juice, but also by improved methods of manipulation in the final stages of production. Laboratory results indicate that combined effort in both of these directions may result in production of beet sugar of high and uniform quality. If this can be accomplished, the differential of 15 to 20 cents per 100 pounds in price against beet sugar should gradually be eliminated, and its removal will result in a substantial increase in the income of sugar-beet growers. It should also be possible, as a result of this work, to attain maximum consumption of beet sugar in the areas of production, thus reducing freight charges and thereby also increasing returns to sugar-beet growers.

MAPLE PRODUCTS

Particular attention was paid to the possibility of increasing diversification of maple products, especially of lower grades in the marketing of which the producer is at present unduly penalized. In cooperation with a large Vermont producer, investigation was continued on a larger scale of the method mentioned in last year's report for producing a concentrate of strong maple flavor, together with a special grade of sugar. The details of the process for efficient production of these products were studied and developed so that this procedure may be published in workable form and made available for general use by producers.

Sufficient quantities of the maple concentrate and special sugar were produced under these conditions to make possible a survey of the market possibilities for these new products. It is anticipated that the strongly flavored concentrate will find use in the ice-cream industry, for instance, and also that it will find an extensive market for use in the production of cane and maple-sugar sirup blends. The production of blended cane and maple-sugar sirups in this way is expected to afford a better financial return to maple producers than the methods of production and marketing heretofore practiced.

UTILIZATION OF CULL SWEETPOTATOES FOR STARCH

The purpose of this investigation is to devise a profitable means of utilizing cull sweetpotatoes. A large proportion of field-run sweetpotatoes (the second largest vegetable crop in the United States and the largest in the South) grown for market is graded out as culls (oversize and undersize) and is largely wasted. A method for production of high-grade starch from these potatoes was developed by this Division. An investigation of some of the properties of sweetpotato starch has been made, and on this basis markets for the starch have been indicated. These markets are as follows:

(1) In cotton mills (for sizing warp yarn, and for finishing). Sweetpotato starch has been tested in several cotton mills which customarily use imported potato starch. The reports from these mills are unanimous in stating that sweetpotato starch gives equally as good results as imported potato starch and that it also has certain advantages, including economy in quantity required. Most of the potato starch imported into the United States is used in cotton mills. Sweetpotato starch can be produced at a competitive cost and should gradually displace the imported product.

(2) As a dextrin for adhesives such as for postage stamps, envelopes, etc. The Bureau of Engraving and Printing has recently tested sweetpotato-starch dextrin prepared by the Carbohydrate Division and, on the basis of both laboratory and machine tests, has pronounced it to be equal to the dextrin made from imported cassava starch, which is now used.

It is estimated that the utilization of all sweetpotato culls at a price commensurate with that which could be obtained for potatoes for starch production would increase the return to growers by some \$4,000,000 annually. A sweetpotato-starch industry is now being established as a result of this work. A factory is being erected at Quitman, Ga., by commercial interests, and the Federal Emergency Relief Administration is financing a factory at Laurel, Miss., for the purpose of providing employment. Relatively small factories (to reduce transportation cost on raw material) of about 2,000,000 to 4,000,000 pounds annual production of starch are contemplated.

CARBOHYDRATES IN DOMESTIC PLANTS

The investigation of inulin in domestic crops described in the last annual report shows that while chicory root (dried) has an inulin content of about 50 percent, only 10 to 12 percent could be crystallized from the plant extract.

The inulin remaining in solution was a total loss in the scheme of production, and it was necessary to investigate the utilization of this otherwise waste material in relation to reducing the cost of inulin if it is to be used for medicinal and food purposes or for production of explosives. (See United States Patent No. 1922123.)

Since, apparently, the chicory inulin remaining in solution is of a soluble type similar to that found in a number of other plants, an obvious method of utilization is to hydrolyze it with production of levulose. There is a market for levulose sirup of good color and clarity and a high degree of sweetness. Such a sirup has a number of advantages over the present commercial sirups, particularly with respect to noncrystallization and use in various food products for promoting retention of moisture.

A process was developed for producing a levulose sirup of very light straw-yellow color and high degree of sweetness and with a sugar content of 79 to 80 percent. Due to its high solubility, levulose does not crystallize from the sirup at this concentration.

Cooperative work on inulin was continued. Additional quantities of inulin were prepared and sent to cooperators. Using material prepared in this division, J. C. Krantz, Jr., of the School of Medicine, University of Maryland, conducted research and has recently published an article showing that soluble inulin is assimilated by animals. This has an important bearing on the possible use of inulin by diabetic patients, as mentioned in the report of last year.

FOOD-RESEARCH INVESTIGATIONS

FROZEN PRODUCTS FROM SURPLUS DECIDUOUS FRUITS AND BERRIES

Youngberries were frozen in cartons and cans at 0°, -40°, and -80° F., packed in dry sugar, and in 40-percent sugar sirup. In all cases there was less bleeding in the berries frozen at -40° and -80° than in those frozen at 0°. The sharply frozen berries also held their shape better. There seemed to be little difference between the berries frozen at -40° and those frozen at -80°. Other berries, plums, figs, and melons were also frozen.

PRESERVATION OF APPLE JUICE BY STERILIZATION, CONCENTRATION, OR FREEZING

Apple juice was concentrated, 6:1, and the esters were separated from the distillates, refractionated, and added back to the sirup in order to retain the apple flavor. The product was used experimentally in the preparation of a carbonated apple beverage, as a table sirup, or in raising the solids content of apple juice before fermentation.

Three types of fermented apple juice were made: By straight fermentation, by fortifying with sugar, and by fortifying with the apple concentrate. Both dry and sweet products were made by the latter method. Many of these products are brilliantly clear, with a vinous flavor, and should be well received.

FERMENTATION FLAVORS IN SIRUPS AND MOLASSES

Taxonomic studies on the yeasts and bacteria responsible for the rum flavor characterizing Barbados molasses have been completed. The sugar-tolerant yeasts were identified as *Zygosaccharomyces nussbaumeri* Lochhead and Heron, and *Z. major* Takahashi and Yukawa. A bacterium, identified as *Clostridium spermoides* (Vinni) Bergey, was found to cause the anaerobic decomposition of organic matter to form higher alcohols, furfural, and aldehydes.

In experiments to determine the possibility of improving the flavors of domestic sirups and molasses by microbial fermentations, particular attention was paid to the flavors that developed in sirups to which organic and inorganic acids and invertase had been added to cause partial inversion of the sucrose. Flavors more nearly resembling those of Barbados molasses were developed in the samples which had been inverted with acetic and phosphoric acids.

STUDIES ON WINE MAKING

Studies on the fermentation of youngberry juice have shown that in certain cases the nitrogen content is not high enough to support fermentation or may not be available to the yeasts. By the addition of ammonium chloride and sugar, alcoholic yields were obtained which were high enough to preserve the resulting wine. It is believed that the youngberry can be adapted to wine making by proper control of fermentation.

An experimental bottling of champagne was designed to study the effects of various fermentable substances on the flavor and fermentation of the wine and the role of various stock yeasts in the production of flavor and character in champagne.

LOOSENING THE HULLS OF WALNUTS

One of the most critical periods in the growth of the Persian (English) walnut occurs about the time it is ready for harvesting. Continued warm weather at this period results in dark- or amber-colored kernels, only a certain percentage of which is allowed in the first-grade pack of shelled nuts. Experiments during the past season indicate that if the harvesting of the crop could be advanced from a week to 10 days and ethylene used in loosening the hulls, a very large gain would be made in the quantity of first-grade nuts. Since immature nuts tend to shrivel and have an off flavor, it is necessary to determine the stage of maturity at which ethylene treatment will bring the desired results. This phase of the problem is now being studied.

SPOILAGE IN SIRUPS AND BEVERAGES FROM WHITE SUGAR

Particular stress has been placed on methods suitable for the removal of yeast stimulants from white sugars. When sugars containing large amounts of yeast stimulants were washed in a nearly saturated sugar solution, made from a high-quality sugar free from stimulants, a reduction was obtained in the yeast stimulant. Since only the outer layer of the crystal was dissolved off, it was concluded that the greater part of the stimulating substance was in the outer portion of the crystal or adsorbed on its surface. Thus inefficient filtration equipment or faulty operation in the factories may account for the presence of excessive amounts of these substances in some sugars.

The methods used to determine the presence of yeast stimulants in sugars were developed and recently submitted in detail to all sugar manufacturers cooperating in this work. The amounts of yeast stimulants present in 55 samples of white sugars obtained during the 1933 campaign have been determined by this standard procedure, and show a distinct improvement in the quality of commercial sugars.

Considerable attention has been given to the numbers of spores of thermophilic bacteria occurring in sugars. Excessive numbers of food-spoilage types were found in 29 percent of the 55 samples of white sugar obtained during the 1933 campaign. From these results it is apparent that some sugars have not yet been improved in quality sufficiently to be acceptable for certification as canning sugars. It is significant that most of the sugars found to be heavily contaminated were from factories situated within a comparatively small area.

An effort was made to determine the probable source of these spoilage thermophiles. Thirteen of the heavily contaminated samples were washed in a heavy sirup free from spoilage thermophiles and dried. A 65-percent reduction in the bacterial content was obtained. Experiments indicate that the thermophilic spores are largely retained on the sugar crystals after crystallization. Some method of eliminating the source of this contamination from the factory should be developed.

FROZEN PEAS

As a result of extensive studies on the production of botulinus toxin in frozen and defrosted peas, the following conclusions appear justified:

(1) When vegetables preserved by freezing are properly handled there is no danger of botulism. (2) Containers of frozen vegetables should not be defrosted or held at room temperature for more than 1 day, preferably not at all. (3) Containers of frozen vegetables should not be kept in an ordinary ice box for more than 3 days, preferably not longer than 2 days. (4) The best method to employ in the home is to cook the vegetables immediately, allowing the heating to do the defrosting. (5) Left-over portions should be held under good refrigeration, but not longer than 1 day.

FERMENTATION OF HAYS

Chemical analyses to determine the decomposition of the important organic fractions of alfalfa hay under partial anaerobic conditions have been completed. The individual organic fractions showed considerable losses after

fermentation, especially the water-soluble fractions, hemicelluloses, cellulose, protein, and to some extent the lignin. The analyses from this study will be valuable in determining those organic fractions in alfalfa hay that may be significant in the production of unsaturated compounds of a highly oxidizable nature.

For several years efforts have been made to set up laboratory experiments on the fermentation and heating of alfalfa hay under controlled conditions of temperature, aeration, and moisture content. No positive results were obtained from these experiments, due to the small quantities of hay used and the inability to control the fermentations.

Large concrete heating chambers, located at the Bureau of Standards and loaned for use in this work, have enabled the Bureau to repeat these experiments on a larger scale and with better facilities for controlling the conditions necessary for fermentation.

Two bales of freshly cut, undercured, second-crop alfalfa hay, with a moisture content of 31 to 33 percent, were used. Exposed for 32 days under automatically controlled and recorded temperatures, the first bale became light brown in color and had a strong pungent odor, but no charring was evident. The second bale was held for 70 days, the temperature being gradually increased to a maximum of 154° C. Artificial heat was then withdrawn, but the temperature continued to rise for 3 days, showing definitely that spontaneous heating was taking place. When removed from the heating chamber the hay was dark brown or black and extremely brittle, but there were no signs of actual combustion. Within 20 minutes wisps of smoke appeared, and after 45 minutes small areas of red glow were visible. When the bale was broken open large clouds of dense white smoke arose, and in less than a minute the center of the charred area was a mass of glowing embers. This is exactly what happens when a heating haymow or straw stack is opened and the oxygen of the air has ready access to the heated pocket.

EFFECT OF GERMINATED WHEAT ON FLOUR

The results show that small amounts of flours from Roman bean and black-eyed pea (cowpea), which legumes had been germinated 1, 2, and 3 days, as well as small amounts of the water extracts from these germinated legumes, had an appreciable effect in bread making; the volume of the loaf was increased and the color improved. Even a small amount of flour from nongerminated seeds of these legumes produced a bleaching effect.

THE STALING OF BAKERY PRODUCTS

Experiments to delay or prevent the staling of bread have been carried on with various colloids, all except an extract of carob-bean flour giving negative results. Freezing at a temperature of 20° F. has been found to delay staling to a marked degree.

PHYTOCHEMICAL INVESTIGATIONS

Work on the isolation, identification, and quantitative determination of varietal differences in the waxlike coating of apples was brought to conclusion.

An investigation of the waxlike fraction of waste pomace produced in the commercial processing of cranberries for sauce has shown that commercial cranberry pomace yields approximately 10 percent each of petroleum ether and ether-soluble constituents. The ether-soluble fraction consists chiefly of ursolic acid, as was found to be the case with apple pomace. The petroleum-ether-soluble fraction is, however, markedly different from that of the apple, consisting principally of fatty acids with only a small amount of hydrocarbons. Constituents isolated from the petroleum-ether extract include the hydrocarbons, nonacosane, $C_{29}H_{60}$, and hentriacontane, $C_{31}H_{64}$; free solid fatty acids of the series C_{18} to C_{26} ; liquid fatty acids, linolenic, linoleic, and oleic, the last predominating.

An examination of the ether extract of grape pomace has shown the presence of oleanolic acid, which is similar in properties and closely related chemically to ursolic acid.

VEGETABLE-PIGMENT INVESTIGATIONS

Investigations of naturally occurring vegetable pigments were continued. One of the primary purposes of this work is to gain more thorough knowledge of the nature and behavior of the substances responsible for color in fresh

fruits and vegetables and their manufactured products in order to arrive at the best means of preserving these easily destructible pigments. Fruits and vegetables deficient in pigment and discolored canned and preserved goods have a much lower market value. From the standpoint of nutrition, the relation of certain naturally occurring yellow pigments to vitamin activity is another very important phase of color research.

During the past year, particular emphasis was placed on studies of color in tomatoes, sweetpotatoes, corn, and apples.

The yellow pigment of Grimes Golden apples has been isolated and purified to the point where it has been assigned the formula of $C_{30}H_{22}O_{12}$. The same substance also occurs in the Jonathan variety. A method has been partly developed for the isolation and crystallization of the red anthocyanin pigment present in Jonathan apples and probably occurring in all red varieties of apples.

THE TOXICITY OF FLUORINE COMPOUNDS

The determination of the comparative chronic toxicities of sodium fluoride, sodium fluosilicate, barium fluosilicate, and cryolite has been completed. Using production of mottled teeth in the albino rat as the criterion of toxicity, it has been shown that 14 to 16 parts of fluorine per million parts of food is toxic regardless of which of the above compounds was used, and regardless of the water solubility of the compound.

Rats placed on a balanced basal ration to which barium fluosilicate has been added feel cool to the touch, although the rectal temperatures are normal, due to a condition of vasoconstriction.

By means of a resistance thermometer, numerous observations on skin temperature have been made. It has been found that the skin temperature of a normal rat varies appreciably with the environmental temperature, but that at any given room temperature, the rats given barium fluosilicate range from 1.5° to 2° C. lower in temperature than the control rats.

Study of this vasoconstrictor action is being continued, control observations being made on rats receiving barium chloride and others receiving sodium fluosilicate. A survey of the literature indicates that this is the first record of a condition of chronic vasoconstriction that has been produced experimentally.

FEEDING-STUFFS INVESTIGATIONS

Continued study of the effect of different wave lengths of light upon the development of rancidity in cottonseed oil, corn oil, and lard showed that the blue end of the spectrum develops peroxides and rancidity much faster than the red end and that green light delimited by 4,900 to 5,800 Ångström units has the least effect on the development of rancidity and of peroxides.

Other experiments show that in the presence of moist air green was effective in retarding rancidity.

Investigations show that a high peroxide value in an oil which has been protected from light is not always an indication that the oil is rancid. A protected oil may have the same peroxide value as an unprotected oil which is rancid and yet be free from rancidity. An oil which has been protected from light may give both the Kreis and Von Fellenberg tests and yet be free from rancidity as determined organoleptically.

OIL TREATMENT FOR SHELL EGGS

The vacuum-carbon dioxide method of oil-treating shell eggs has been proved to be approximately 30 percent more efficient in maintaining original egg quality in comparison with other commercial methods of oil treatment. Carbon dioxide has a beneficial effect in maintaining the hydrogen-ion concentration of the egg white to a point more nearly comparable with that of fresh eggs. The pH value for the fresh-laid eggs was found to be 7.69; for 36-hour fresh eggs, 8.65; stored unoled eggs, 8.99; stored vacuum oiled (air release), 8.17; stored vacuum oiled (CO_2 release), 7.91; the latter being only 0.22 above that of the fresh-laid eggs. Eggs treated by the vacuum method have less oil on the shell surfaces to be taken up by the paper-pulp packing materials than do eggs treated by other methods.

Broken-out eggs, treated with dry CO_2 gas and quick-frozen, keep better and yield a more uniform product than eggs prepared by the usual commercial treatment.

Carbonation and quick freezing together have a marked effect on keeping down the number of surviving organisms.

COMPOSITION AND UTILIZATION OF FLORIDA ORANGES

Pleasant alcoholic beverages have been prepared from fermented citrus juices. Among these are tangerine, orange, lime, and lemon cordials, and blended and fortified wines, and brandy.

COMPOSITION AND UTILIZATION OF FLORIDA GRAPEFRUIT

A very satisfactory carbonated grapefruit beverage, with the characteristic bitter grapefruit taste, has been developed. This beverage may be slightly sweet to be used straight as a beverage or "dry" for mixing with alcoholic drinks. A cocktail was prepared by adding gin and sugar sirup to grapefruit juice followed by flash pasteurization. Grapefruit brandy and cordial and a fortified grapefruit wine, similar to a sherry, have also been prepared.

COMPOSITION AND UTILIZATION OF TEXAS GRAPEFRUIT

Grapefruit juice and pulp were prepared by knife-peeling the fruit and extracting the juice and pulp in a modified tomato pulper with screen perforations of three-sixteenths inch in diameter. For shipment in barrels, 1,300 p.p.m. of sulphur dioxide was added as sodium bisulphite. This product retained its flavor and color satisfactorily for several months when filled full in 50-gallon white-oak barrels. The amount of sulphur dioxide may be quickly reduced by passing a stream of carbon dioxide through the warmed pulp.

The juice and pulp mixture, without preservative, was heated in a coil pasteurizer to 180° F. and filled in 1- and 5-gallon tin containers. These two methods were applied commercially during the past season, and according to reports furnished by manufacturers, 150,000 to 200,000 gallons of the products were packed for export.

HEAT PASTEURIZATION OF ORANGE JUICE

Orange juice, deaerated and flash pasteurized, has been in storage at 55° F. for 13 months. Although lacking the aroma of freshly extracted orange juice, the packs in glass and enamel cans had a satisfactory flavor after 13 months storage at 55°. Packs in plain tin cans did not possess such a pleasing flavor. Unfortunately, the enamel of the cans was not stable, and blistering was apparent after 6 months. Storage at temperatures higher than 60° tends to accelerate the development of off flavors, which are pronounced after 4 months if the temperature is consistently as high as 95°. Storage at 45° would add about one-half cent a case per month to storage charges for the canned juice.

ENZYME STUDIES

One of the fundamental changes noted in shell eggs during storage is the thinning of the thick white and the weakening of the vitelline membrane. This change lowers the egg grade from a quality standpoint and markedly reduces the value of the eggs.

It was found that the proteolytic enzyme of egg white is trypsin. The enzyme was found only in the "thick" fraction of the egg white, which can be separated from the "thin" or watery portion by pouring the whole egg white onto a wire screen. The thin white, instead of containing active trypsin, holds an inhibitor of tryptic activity, so that a mixture of thick and thin white usually shows no tryptic activity whatever.

It was found that the weakening of the yolk membranes and the formation of thin or "watery" whites are both caused by the presence of trypsin, and the chemical mechanism of the formation of watery whites and fragile yolks has been discovered and described.

The change of thick to thin white can be accelerated by the addition of a proteolytic ferment to the egg white. This has an important industrial application in that it forms the basis for a process of rapidly thinning down egg white without allowing it to putrefy. Accordingly, two applications for public-service patents have been filed.

It has been found that inhibitors of peroxidase fall into two classes: (1) reversible inhibitors, which compete with the substrate for the enzyme, and (2) irreversible inhibitors which injure the enzyme itself. In the fruit-darkening problem, the irreversible inhibitors are naturally more important. Comparatively few of these substances were found, most of them powerful poisons. It was discovered, however, that the peptide glutathione, and sub-

stances chemically related to it, are strong inhibitors. These nontoxic substances occur in many food products and were therefore used in experiments on preventing the darkening of fruits on drying.

Treatment of sliced apples with very dilute solutions of cysteine hydrochloride or glutathione by dipping, or better by spraying, prevented discoloration on drying. Apples thus dried show no discoloration, even after several months exposure to ordinary sunlight.

This effect could also be expected by treating the cut fruit with the juice of a plant known to contain a natural activator of a plant protease, such as pineapple, and experiments showed that this deduction was correct. By spraying the cut apples with pineapple juice or fractions isolated therefrom, similar results to those described for glutathione were obtained.

INDUSTRIAL FARM PRODUCTS DIVISION

HIDES AND SKINS

Improper and negligent handling is responsible for an annual waste of domestic hides and skins estimated at over \$20,000,000. Several contributions have been made during the past year toward conserving and improving the quality of these raw materials.

United States Department of Agriculture Technical Bulletin No. 383, on the reddening of cured hides, is now available. This bulletin, while dealing primarily with research studies, contains practical information on better curing of hides and skins, especially in showing those salts usually carrying hide-reddening organisms, and those conditions both favorable and unfavorable to the growth of these organisms.

Many commercial salts carry not only reddening organisms, but also other organisms. New and useful observations concerning these salt-tolerant bacteria have been published. They are shown to be capable of growing on a medium containing as much as 25 percent of salt, which means that even thorough salting of hides and skins will not prevent their growth although it will materially retard it. As a group these organisms liquefy gelatin with varying degrees of rapidity, from which it may be generally concluded that they have a similar destructive action on hides and skins.

Damages running into thousands of dollars frequently occur from molds on hides and skins which cause permanent staining of the resulting leather. From a study of molded pickled sheepskin, it was shown that the mildewing resulted from a lowering of the acidity of the skins brought about by absorption of the acid by the wood of the casks in which shipment was made. It was also shown how some molds reduce the acidity of the material upon which they are growing. Damages of this type could be largely eliminated by increasing slightly the original acid content of the pickling liquor, or in this particular instance by the simple expedient of soaking the wooden casks with the pickle liquor prior to packing.

Recently initiated researches on the problem of greasy hides have yielded valuable original data in showing that fat is deposited in large quantities in some cattle hides while on the living animal and that the content of fat runs much higher than has been realized heretofore and varies widely in different portions of the same hide. This work has been summarized in two publications. Greasy hides are apparently on the increase and constitute an economic problem, because leather made from them brings a lower price. These studies are being continued as authentic material becomes available in order to acquire data for correlating life history of the animal with the occurrence of greasy hides.

Economy measures have necessitated abandonment of field work among producers and dealers on eliminating wasteful practices in skinning, curing, and handling of hides and skins. This work was carried on in the South and East and had shown definite accomplishments in improving the quality and increasing returns locally for hides and skins.

TANNING MATERIALS

The present established domestic supplies of tannin are inadequate. One-half of the \$20,000,000 to \$25,000,000 worth of tanning materials used annually are imported from foreign sources. In other words, there is a yearly volume of business of at least \$10,000,000 in tanning materials that might be diverted to home supplies in the form possibly of a new crop for American farmers.

Studies have been actively continued on the utilization of the waste hemlock bark of the Pacific coast region as a new commercial source of tannin for the purpose of acquiring full economic, technical, and practical information to determine whether or not commercial extract production from this waste bark may be expected to succeed and thus give to farmers, landowners, and labor a new source of income and American tanners a new domestic tanning material. Large-scale sole-leather tanning experiments have been completed using Pacific coast hemlock bark extract blended with other materials. The hemlock leather was rated quite satisfactory. Comparative shoe factory cutting values showed a differential of 0.54 cent per pair for the hemlock crop soles, and 0.37 cent per pair for the belly soles as compared to the regular tannage. Practical tanning tests and laboratory observations show that the amount of red typical of hemlock is much less with the Pacific coast species than with the better-known Eastern bark. Artificial drying experiments on a commercial scale are being made to determine the feasibility and cost of this essential operation. Soles cut from sides of the same hide tanned in part with and without Pacific coast hemlock bark extract are now being tested for comparative wearing quality by cadets of the United States Naval Academy.

LEATHER

The frequent failure of leather to render satisfactory service has been shown by pioneer research work by the Bureau of Chemistry and Soils to be due to absorption by the leather of destructive quantities of acid from the open air. This lead is being intensively followed to develop tannages, leathers, and treatments having a high degree of resistance to this natural agency of decay in order to hold and increase the market for leather goods.

A keen interest in the application of this work on leather rot to commercial production of more serviceable leathers of various types is being shown by the tanners. Data are being assembled for publication on the comparative resistance of chrome and vegetable leathers to rot from acids in the air, and also on effective treatments to retard this decay. Chrome leathers show a distinct superiority. Treatment of leather with calcium and sodium salts of certain organic acids, ordinary salt, and the natural nontannins appear to be distinctly helpful. These findings, regarding especially the natural nontannins, may be one of the most valuable contributions yet made to the subject of acid decay of vegetable-tanned leather. Marked changes in many of the present concepts may result and countless leads opened up towards new lines of research for developing longer lasting leathers.

The acid content of leather intended for long service is an important matter to both makers and users of leather. Discrepancies in determining acidity frequently occur. A contribution showing clearly a cause of discrepancies in acidity by the Procter-Searle method was published during the year. Concordant results depend vitally on the manner and rate of making ignitions of the specified mixture of leather and sodium carbonate, especially when sulphited tanning materials are involved. These findings have been acknowledged as valuable to the trade in transactions in which purchase of leather is based on a specified acidity limitation.

NAVAL STORES

The chemical and technological research work on naval stores is directed toward saving for producers preventable losses through improvement in process, equipment, and practices; and in enlarging the market for their products by the development of uses and better adaptation of products to uses. Studies on production, processes, and equipment are made at the naval stores station located in the Osceola National Forest near Lake City, Fla. This is a complete producing plant and is operated experimentally on an industrial scale. Fundamental research on composition, properties, and uses of naval stores, and investigations designed to assist the work at the naval stores station are conducted in the Washington laboratories.

WORK OF NAVAL STORES STATION

In a study of the operation of the turpentine fire still, 248 charges of gum and mixed gum and scrape were run during the year. A number of these served as demonstrations for the benefit of visiting producers and their stillers, and for forestry and engineering students. From the gum used, all making I

grade or better rosin, the average combined yield of turpentine and rosin was 84.4 percent of the weight of gum received. The ratio of turpentine to rosin was 1 pound of turpentine to 3.46 pounds of rosin. The grades of rosin produced included: WW, 80 charges; WG, 93 charges; N, 33 charges; M, 27 charges; K, 13 charges; and I, 2 charges.

A special device for sampling barrels of turpentine gum was invented by a member of the station staff, and a public service patent (No. 1953886) covering the invention, was granted.

Experiments with the common salt dehydrator, while not completed, have gone far enough to show quite conclusively that it pays the producer to use it. There are fewer "turns", on arrival at market, the turpentine contains but a trace of water, and it is less likely to discolor and thus bring a lower price. Batteries of dehydrators have been installed by some of the more progressive dealers in turpentine.

Advice and information on various stilling problems were given to about 700 persons who visited the plant at Olustee and the office in Lake City, and to the 275 persons requesting information through correspondence, as well as to the forces of 20 turpentine plants visited by members of the station staff.

COOPERATIVE NAVAL STORES WORK

The results of investigations on improved practices and equipment for naval stores production were carried to producers in Georgia and Florida through cooperative agents. In Georgia 15 complete naval stores plants were built in accordance with specifications supplied by the Bureau's cooperative agent. In Georgia and Florida there were 50 installations of the Bureau's improved fire still setting, 47 of which were constructed under direct supervision of the cooperative agents or members of the station staff. At the present time 28 counties in Florida and 19 in Georgia have one or more fire stills with the improved setting, which serve as demonstration units for nearby operators. The Bureau's improved method of regulating distillation in fire stills, based on the ratio of spirits to water in periodical samples of the distillate, was introduced at 104 plants. About 20 turpentine dehydrators, designed to remove water from turpentine and thus make it less likely to leak through glued barrels and less liable to deterioration during storage, and more than 40 covered turpentine separators, designed to prevent loss by evaporation, were installed under the supervision of the cooperative agents.

CHEMISTRY OF NAVAL STORES

In the laboratory investigations on constants and properties of rosin and resin acids, pure levo-abietic acid was prepared, together with salts of this acid with organic bases including alkylamines and alkaloids. The diamylamine salts were found to be very useful in the separation of levo-abietic acid from its isomers.

Experiments were made on the preparation from pine gum of resinic acid fractions, some consisting chiefly of pimic acids, and others chiefly of sapinic acids. These preparations when fused had the appearance of very clear and light-colored rosins. They were, however, much paler than commercial rosins, and differed somewhat in composition and physical properties from ordinary rosin. The methods used in preparing them, or modifications of these methods, may prove of technical value in making rosins especially adapted to specific purposes.

A preliminary study of the composition and properties of rosin as affected by bleaching with oxalic acid indicated that the acid and saponification numbers of rosin are not appreciably changed by such treatment. With vigorous or prolonged treatment, the rosin may become crystalline.

FARM FABRICS

One of the most important problems in connection with preservation treatments for fabrics, and one on which little progress has been made industrially, is the development of an inexpensive weather-resistant fireproofing treatment for fabrics used out of doors. Such treatment will be of material service to agriculture as a means of protecting tools and crops and in extending the use of cotton.

During the past year a new glow-proofing chlorinated resin, designed especially for use in the fireproofing of cotton was developed, and its industrial

production is being studied under the direction of the Bureau. It is cheap, effective, and possesses good waterproofing properties. With the well-known Perkin process as a starting point, a largely new and complete fireproofing process was worked out and is now being developed commercially. The new features of this process include the mutual reaction of sodium stannate and heavy metal salts resulting in the precipitation of cheaper metallic oxides with tin oxide, an additional step for increasing the quantity of colored oxide to protect the fabric against deterioration by sunlight, and finally a coating with the new glow-proofing resin, which is, in reality, a flame-proofing agent as well. Three applications were filed for public service patents on the improvements devised.

As a result of collaboration between the Division of Industrial-Farm Products and the Division of Soil Microbiology, a new, rapid, and serviceable test to determine the mildew resistance of fabrics was developed and is now ready for publication. Tests made by this method on untreated duck, samples treated in the laboratory, and samples subjected to commercial treatments, gave consistent results.

PAPER AND FIBER BOARD

The work on deterioration of paper dealt with the effect of small quantities of acids which are retained in paper as a result of manufacturing processes, and the effect of sulphur acids which are absorbed by paper from the atmosphere during storage on library shelves. A series of experiments dealing with the effect of known small quantities of aluminum sulphate, sulphuric acid, and hydrochloric acid on the physical properties of a water-leaf sulphite bond paper high in alpha cellulose was completed. The results, now being compiled for publication, showed that small quantities of these chemicals caused rapid deterioration and that hydrochloric acid caused greater and more rapid deterioration than did sulphuric or aluminum sulphate when the active acidities, as measured by the pH value of the water extract, were the same. The results are of great value in pointing out the necessity of washing out excess chemicals which may form free acids and of using only the minimum quantity of alum in sizing.

A study of a large number of samples of paper taken from old books, magazines, and volumes of court records ranging in age from 19 to 169 years was completed. The results, which will be published, show that paper absorbs from the air harmful quantities of sulphur-acid gases which accumulate in the paper and help to cause its early rotting.

The addition to paper at the time of manufacture of a substance that will neutralize or counteract acidic sulphur compounds as they are absorbed by the paper should materially increase the serviceability of valuable books and court record papers.

The work on the collaboration with Government agencies and scientific societies has been continued along the same general line as in previous years. In this connection, considerable work was conducted in collaboration with the Bureau of Plant Industry in preparing tentative specifications and examining Kraft paper bags proposed for use during this season in pollination experiments on corn.

A large volume of general information dealing with the chemistry and chemical technology of paper-making, fibrous materials, and of paper and fiber board was furnished through correspondence.

FARM BYPRODUCTS

The work on farm byproducts, carried on in collaboration with Iowa State College at Ames, Iowa, is designed to find and develop large-scale industrial uses for materials which are normally obtained as byproducts in the production of ordinary crops and are now largely wasted. These byproducts include, in the order of available quantities, cereal straws, cornstalks, corncobs, cotton stalks, oat hulls, flax straw, cottonseed hulls, sugarcane bagasse, peanut hulls, and miscellaneous crop wastes.

DESTRUCTIVE DISTILLATION OF AGRICULTURAL BYPRODUCTS

In the study of chemical products from wastes by destructive distillation, special attention was given to nut shells as raw material because of their dense structure and the greater possibility of developing immediate industrial utilization of products, particularly carbon. It was found that with the con-

tinuous operating retort and uniform conditions there was practically no fluctuation in yields. The fractionation and composition of the oils obtained in the destructive distillation of various wastes were studied and promising results were obtained on the value of oil from tobacco stems as an insect repellent and for controlling certain animal parasites. Some use has been made of destructive distillation oils in cattle sprays, and work on the tars resulting from the destructive distillation of farm wastes is being done in cooperation with the Color and Farm Waste Division of the Bureau.

Experiments on the possibility of increasing the yields of particular products of destructive distillation by catalysis, pressure, or other means were made in the laboratory to ascertain the factors involved before undertaking trials with the large apparatus. Wastes not previously tested, including Spanish moss, flax shives, and lignin, were investigated on a small scale. Fuel briquettes were made in the laboratory from farm wastes and from the carbon obtained from such wastes. The economic possibilities of such fuel have not yet been determined.

FERMENTATION OF FARM BYPRODUCTS

Studies were continued on the production of utilizable gases and residues from farm wastes by fermentation, and on the mechanism of the breakdown which occurs during fermentation. The experimental farm unit gas plant failed to function satisfactorily, thus making further experimentation necessary before this problem is solved. Work is in progress to isolate pure cultures of bacteria which can effect the decomposition of farm wastes in a particular manner. Experiments were started on the aerobic decomposition of farm wastes. The microorganisms and conditions involved in the production of organic acids and other nongaseous compounds were studied in experiments with waste "hydro" sirup from corn-sugar refining, waste gluten, and "steep" water. The results gave promise of obtaining economic yields of products suitable for use as solvents and motor fuel. Some attention was given to the problem of using alcohol-gasoline mixtures as motor fuels. Studies on the possible utilization of lignin and the formation of lignin compounds for industrial uses were continued.

OIL, FAT, AND WAX INVESTIGATIONS

COMPOSITION OF OILS, FATS, AND WAXES

The seeds and oils from over 70 new varieties of soybeans which were collected in the Orient by the Division of Forage Crops and Diseases of the Bureau of Plant Industry, in order to make a study of their cultivation, properties, etc., have been investigated by the Oil, Fat, and Wax Laboratory with special reference to the oil content of the beans and the character of the oil from the beans of each variety. The principal object of this study is to find soybeans the oils of which have distinctly stronger drying properties than the oils now produced in this country, and which will be of special value to the paint, varnish, and linoleum industries, providing the cultivation of these varieties is adapted to American farming conditions, and meanwhile this is being investigated by the above-mentioned Division. So far three varieties of soybeans have been discovered, the iodine numbers of which, by the Hanus method, range from 137.3 to 138.3, which are notably above those of our domestic soybean oil. Of the oils studied three others were found which gave unusually low iodine numbers (119-123), indicating that they would be especially desirable for edible purposes on account of their weak drying properties and the ease with which they could be suitably refined for such use.

Upon comparing the oil content of the beans from the different varieties of soybeans with the iodine numbers of the respective oils, it was found that the beans giving the highest iodine numbers contained from 15.5 to 17 percent of oil, whereas those giving the lowest iodine numbers contained 20.6 to 22.5 percent of oil. It is interesting to note in this connection that the beans of the wild Manchurian soybean which were examined contained only 7.5 percent of oil, but the iodine number of the oil was 151.7.

Pataua oil, known also as Comou and Batava, which is obtained from a pericarp or pulpy portion of the fruit from the palm *Oenocarpus batava*, a native of tropical Brazil and Venezuela, is found growing in the marginal forests of the Amazon and Orinoco Rivers. This oil, unlike the well-known African palm oil and many other South American palm oils, is not only liquid at room temperatures but does not solidify until cooled to -5° C., and some-

times even a lower temperature is required. This oil has the appearance of olive oil. Its characteristics are similar, but the iodine number is slightly below that of most olive oil on the market. It is particularly useful as a salad and cooking oil, and from its characteristics and composition it would appear to be suitable for use in certain cosmetic preparations. The possibility of growing this palm in the warmer sections of California and Florida has not yet been investigated, although in the latter State several specimens of related species have recently been introduced which so far appear to be doing very well.

The present investigation was made on a large sample of the oil received from the Instituto de Oleos of the Brazilian Department of Agriculture. The oil which had a saponification value of 190.4 and gave an iodine number of 75.4, was found to contain 14.4 percent of saturated acids and 79.9 percent of unsaturated acids. It should be mentioned that the seeds of this palm fruit contain only about 1 percent of oil and consequently are of no interest to the oil miller.

PROTEIN AND NUTRITION INVESTIGATIONS

HUMAN REQUIREMENTS FOR VITAMIN B

There is very little published information that will permit accurate estimation of the quantity of different foods that must be consumed to meet human requirements for vitamin B. In order to obtain some definite information on this point a preparation of tikitiki, which is used in the Philippines for the treatment of beriberi, has been assayed for vitamin B. Beriberi is a disease that occurs most frequently in the Orient, but also in other parts of the world due to an insufficient intake of vitamin B. Tikitiki is a vitamin-B-containing preparation which is made by the Philippine government for treating the disease. The prescribed daily dose of tikitiki contains approximately 200 international units of vitamin B, according to our assays. This quantity of vitamin B is sufficient to cure beriberi where the amount of vitamin B from food sources is very low. From these observations it would seem that 200 units of vitamin B daily should be sufficient to prevent the occurrence of symptoms of vitamin B deficiency in man.

INTERNATIONAL VITAMIN STANDARDS

A great deal of interest has been shown in the use of the international vitamin standards. The Protein and Nutrition Division has issued the standard for vitamin A to 30 laboratories, the standard for vitamin B to 40 laboratories, and the standard for vitamin D to 21 laboratories.

The use of these standards will greatly enhance our knowledge of the distribution of vitamins in various food material and the vitamin requirements of man and other animals. At the present time the vitamin content is not expressed accurately enough, due largely to limitations in the methods that have been used in measuring them. The international standards make possible the use of the same "yardstick" in different laboratories in different countries and thereby coordinate the efforts of most investigators in the field.

THE EFFECT ON VITAMIN C CONTENT OF FLORIDA GRAPEFRUIT FROM SPRAYING

Studies on the vitamin C content of oranges made by this Division a few years ago demonstrated that orange trees sprayed with lead arsenate produced fruit low in vitamin C content. Since that time there has been a great deal of interest in the possible effect of spraying grapefruit trees with lead arsenate. As a part of an extensive project, in which the Bureaus of Plant Industry, Entomology, and Chemistry and Soils have cooperated, this Division has made vitamin C studies of grapefruit from trees which have received various spray treatments. While there appears to be some indication that lead or calcium arsenate spraying may reduce vitamin C content the results obtained to date are not consistent. There is no pronounced effect as in the case of oranges or in tangerines. Tangerine trees sprayed with calcium arsenate produced fruit with a vitamin C content only one-half of that of control fruit.

STUDIES ON THE DIGESTIBILITY OF PROTEINS

Two considerations determine the value of proteins in the nutrition of animals, namely, chemical composition and digestibility. Not only must the protein contain enough of the nutritionally essential amino acids, but it must be suffi-

ciently digestible so that these amino acids will be available for the nutrition of the animal.

Digestibility coefficients of the proteins of many feedstuffs have been calculated and are recorded in books and bulletins. These coefficients, determined by feeding experiments, are very approximate and show nothing of the nature or type of the indigestibility factor. They offer no explanation of the inherent causes of the indigestibility, whereby corrective or preventive methods may be applied to solve problems in nutrition arising from this question.

Certain processes and treatments employed in the preparation and manufacture of foods markedly affect their digestibility and food value.

A method commonly used for the purification and preparation of casein for scientific purposes involves treatment with dilute alkali. Much, if not most, of the casein sold as high-grade casein for scientific work is prepared by this method. Experiments conducted during the last year showed that dilute alkali produced drastic changes in the casein, involving practically complete destruction of the nutritionally essential amino acid cystine. Many discrepancies in the results of scientific work recorded in the literature in which so-called purified casein was used can be explained on the ground that this protein did not represent unchanged casein, but was an altered protein produced by the method used in its preparation. This information is of great importance in experimental feeding tests with small animals. Purified casein is generally used to supply the protein factor in the basal rations. If the casein is prepared by a method that lowers its cystine content, the animals will not grow satisfactorily, and entirely erroneous conclusions may be drawn, ascribing the growth failure to lack of the vitamin or whatever other nutritional factor is being assayed rather than to lack of cystine in the casein.

AMINO ACIDS IN WHOLE WHEAT, CORN, AND OTHER FARM PRODUCTS

In our previous studies on soybean proteins it was found that different varieties of soybeans showed variations in the content of the amino acids, cystine and tryptophane, sufficiently great to be significant from the standpoint of nutritional value. These analyses were made on the isolated protein of the soybeans and not on the whole seed. They do not, therefore, give an accurate measure of the amino acids in the whole seed or meal. There are other proteins present in smaller proportions concerning the composition of which no information is available. In order to get a better picture of the content of the amino acids of the whole seed or meal, recently developed methods have been applied for the determination of cystine and tryptophane in soybeans, which give a fairly accurate picture of the amounts present in the whole seed or meal.

Six varieties of Korean and Japanese soybeans showed relatively high percentages of cystine and tryptophane. Although these varieties have not yet been grown in the United States, except on an experimental basis, the values found are of interest in case they prove to be adapted to the soil and climatic conditions in the United States.

NUTRITIVE PROPERTIES OF LESPEDEZA SERICEA AND OTHER FORAGE GRASS

Lespedeza sericea is a new perennial legume which grows readily on the thinner acid soils of the Southeastern States. It provides a dependable hay crop, and is especially adapted for pasture for sheep.

The Bureau is making a study of the proteins of these grasses to see if they can take the place of alfalfa and other grasses which cannot be successfully grown on certain acid-soil areas in the United States.

Preliminary experiments were carried out with the cooperation of the Bureau of Dairy Industry to get information as to where the liberation of protein from hay takes place in the digestive tract. The stomach contents of a cow taken immediately after killing were analyzed for nitrogen distribution. The cow had been on an alfalfa ration. It was found that the nitrogen ratio between the solids and liquids of the stomach contents changes from 10:1 in the rumen to 2:1 in the abomasum, the fourth stomach pouch, showing that a large part of the proteolytic activity occurs in the latter organ. No protein could be separated from the contents of the abomasum, although it gave a slight biuret reaction.

PROTEINS OF YEAST

The extensive use of dried yeast, particularly in mixed feeds, warrants further studies of its nutritive value. Difficulty has always been encountered in extracting the proteins of yeast to permit accurate determination of its amino acid content. It has been found that the amount of protein that can be extracted from fresh yeast is greatly increased by a preliminary treatment of the yeast with ether. Without this preliminary ether treatment only about 40 to 50 percent of the total nitrogen can be extracted, whereas after 42 hours' contact with ether, 91 percent of the yeast nitrogen was removed by the solvents used. The average crude protein content of dried yeast is about 50 percent. This value is obtained by multiplying the nitrogen content by 6.25. In these studies only one-half of the nitrogen was found to be present as protein nitrogen, so that the dried yeast would contain about 25 percent true protein. The cystine, tryptophane, histidine, and lysine content of this protein places it in a favorable position among proteins considered of good quality.

COLOR AND FARM-WASTE INVESTIGATIONS

FAST DYES FOR AGRICULTURAL FIBERS

The Bureau's work on the methods of preparation of the intermediates used in the manufacture of dyes, especially those for use on cotton, has resulted in improvements in these methods which, according to estimates by representatives of the industry, will result in savings of \$750,000 annually. Such savings enable the industry better to meet the competition of imported dyes and, at the same time, so cheapen domestic products as to permit their greater utilization on cotton goods.

Other investigations along this line indicate that iron reactors may be substituted for the usual enamel- or lead-lined apparatus used in many manufacturing processes for vat-dye intermediates. It is estimated that the substitution of cheaper apparatus in the industry, as a result of these discoveries, will lead to marked savings in the cost of manufacture.

FERMENTATION INVESTIGATIONS

In its work in the field of mold fermentation, the Color and Farm-Waste Division has demonstrated that it is possible to use molds in a submerged condition under pressure and so produce results superior to those actually obtained by the same molds grown on the surface according to the usual method. This discovery is of great importance, because it is hoped by this means to use molds on a large scale in a manner similar to that now employed for yeasts and bacteria, thereby making the former of equal importance as industrial biological agents in the transformation of agricultural products to industrial materials.

FARM-WASTE INVESTIGATIONS

One of the chemists of this Division has been assigned to work in cooperation with one of the leading sugar manufacturers in Hawaii, on the application of the Bureau's method for the production of high-grade cellulose from sugarcane bagasse by the nitric acid-pulping process. The reports received up to this time are most encouraging, and it is believed that the adoption of this process may lead to the establishment of sugarcane bagasse as an important source for high-grade industrial cellulose.

LIGNIN INVESTIGATIONS

Experiments on the production of a nitrogenous fertilizer from the lignin sulphonic acids found in the waste sulphite liquor from paper-pulp mills have been continued. Practical tests have demonstrated that the material so formed is equivalent in value to some of the better known industrial fertilizers.

BIOLOGICAL STAINS

While less spectacular, the work of this Bureau in cooperation with the commission on standardization of biological stains in establishing and maintaining a satisfactory source of stains for the use of the biological scientists of this country has continued. Special attention is being given to the role

played by impurities in many of the difficulties encountered in the application of certain stain technics. In addition, this Bureau has rendered assistance to the Bureau of Plant Industry and the Bureau of Animal Industry by the application of the spectrophotometer to the study of certain of their problems.

INSECTICIDE INVESTIGATIONS

TOXICITY OF INSECTICIDAL PLANT CONSTITUENTS

The study of the toxicity of rotenone derivatives to goldfish was continued and the toxicity: concentration relationships for acetyldihydrorotenone, dihydro-rotenolone, acetyldihydrorotenolone, and acetylrotenolone established. That data obtained were published in the *Journal of the American Chemical Society*.

Consideration of the means of representing the toxicity of compounds by equations or formulas led to the discovery that the minimum value of the product of concentration and time to kill has certain advantages to recommend it, and may be considered as representing the conditions under which an insecticidal material is most efficient.

All of the derivatives of rotenone are less toxic than rotenone to goldfish with the exception of dihydrorotenone, which is 1.4 times as toxic.

USE OF PRODUCTS DERIVED FROM DERRIS AND CUBÉ

The observation made in last year's report that rotenone and extracts of cubé and derris may have value as fly-spray materials was followed during the past year by the completion of an extensive investigation of this subject by the Insecticide Division and the Bureau of Entomology. It was shown that extraction of powdered roots with the type of mineral oil used in fly sprays produces solutions comparing very favorably in insecticidal effect with commercial fly sprays; there is a noticeable difference, however, in the type of action exerted, the derris extracts being less rapid in their action, producing less spectacular paralysis of the flies than is observed with pyrethrum, but permitting fewer recoveries. The supplementary nature of the two reactions suggests the advisability of using mixtures of pyrethrum and derris, the former to paralyze the flies quickly, the latter to ensure their ultimate death.

The demonstration that rotenone undergoes photochemical decomposition when exposed to sunlight was completed last year. This year a beginning was made on the problem of preventing this change by the use of antioxidants. Both chemical and entomological tests were conducted. Tannic acid, hydroquinone, alpha-naphthol, beta-naphthol, and lecithin showed some retarding effect. However, when mixtures of dry rotenone and dry antioxidant were exposed to the arc and then tested insecticidally against mosquito larvae, no definite indication of value was found for any of the compounds tested, which included besides those just mentioned pyrocatechol, p-hydroxybenzoic acid, gum guaiac, phenylhydrazine, maleic acid, anthracene, trioxymethylene, cuprous oxide, and ferrous carbonate. By chemical methods it was also shown that very dilute alkali hastens the rate of decomposition in solution, whereas the equivalent degree of acidity has little or no effect. During the year some samples of cubé and derris that have been stored for a long time were reanalyzed for rotenone and total extract. There was no obvious change in the latter, but there was some indication that the rotenone content had decreased in a few instances. Further work is necessary to prove the point, however.

The approximate solubility of rotenone was determined in safrol, tetrahydronaphthalene, methyl isobutylketone, ethyl benzene, cyclohexanol, and decahydronaphthalene. Of these, safrol is the best solvent, 100 cc dissolving about 10.9 g of rotenone.

MISCELLANEOUS FISH-POISONING PLANTS

The investigation of the toxic resin present in the seeds of *Croton tiglium*, mentioned in last year's report, was completed. The exact chemical nature of the resin was not discovered, but much information concerning its characteristics was obtained. It is neither a glycoside nor a glyceride, but most likely a complex ester of a polyhydroxy phenol. Two hydroxyl groups are present and play an important part in its vesicant and toxic behavior. The presence of oleic, linolic, caprylic, capric, lauric, myristic, and palmitic acids was proved after a fractionation of the methyl esters.

A study of the rotenone content of those domestic species of *Cracca* which the Insecticide Division could obtain has been under way through most of the year. All samples have been examined for rotenone, total extract, and methoxyl and some of them investigated insecticidally. No particularly promising samples of *C. virginiana* were found, but one sample of *C. latidens* proved to contain 0.4 percent of rotenone. Near the end of the year the Bureau of Plant Industry began an extensive survey of the occurrence and cultural requirements of *C. virginiana*. The Insecticide Division is cooperating in the chemical examination of the specimens collected.

The miscellaneous plants examined for insecticidal constituents comprised the following: *Aristolochia cymbifera*, *Barringtonia racemosa*, bejuco bravo, bejuco de candelaria, berberra, campalca, *Celastrus rugosus*, colombo, *Cracca candida*, *C. latidens*, *C. lindheimeri*, *C. piscatoria*, *C. toxicaria*, *C. vogelii*, *Derris grandifolia*, embay, *Euonymus europaeus*, *Fluggea microcarpa*, *F. virosa*, *Galactia elliottii*, *Imperatoria ostruthium*, *Ledum glandulosum*, *Lonchocarpus izabalanus*, *L. peckoltii*, *Mundulea suberosa*, *Ocimum sanctum*, *Ocotea bullata*, *Plumeria* sp., *Polygonum* sp., quassia, *Saussurea lappa*, and sourwood. Rotenone was found in berberra, *Cracca piscatoria*, *C. latidens*, and *C. lindheimeri*. Crystalline compounds were obtained from some of the others and are being further investigated. From one sample of *Lonchocarpus* there was obtained about 1 percent of an easily crystallized compound with the empirical formula $C_{26}H_{26}O_6$. It is a new compound and was named lonchocarpic acid.

A renewed attempt was made to elucidate the composition of derris resin so far as compounds other than rotenone are concerned. The data obtained indicate that it consists largely of optically active toxicarol and deguelin, with no tephrosin. An investigation was made of the rotenonolones which can be prepared from rotenone. Four isomeric compounds, differing probably in the position of the hydrogens on the central asymmetric carbon atoms, have been prepared.

PHARMACOLOGICAL TESTS OF INSECTICIDAL PLANTS

Tests were completed during the year of the acute toxicity (by mouth) to guinea pigs of rotenone, dihydrorotenone, dehydrorotenone, rotenonone, deguelin, tephrosin, toxicarol, a derris resin from which the crystallizable constituents had been previously removed, and four samples of derris root of different rotenone and total extract content. A paper describing the results of these tests is being prepared. Long-time feeding tests were begun with white rats and rotenone to determine the chronic toxicity of this insecticide.

PHYSICAL PROPERTIES OF ANABASINE

The specific gravity of pure anabasine was found to be 1.0451 at 20°/20°. The vapor pressure of anabasine from 79° C., at which temperature it amounts to 2.5 mm of mercury, to the boiling point at 281.3° was determined. The index of refraction and optical rotatory power were measured, and some evidence of autoracemization obtained.

NICOTINE

The entire year was devoted to the study of the compounds which the clay known as bentonite makes with nicotine and other organic bases. These compounds are of great interest as a means of adapting liquid organic bases to use as solid insecticides active against chewing insects.

Various samples of the compounds which bentonite makes with nicotine and with anabasine were prepared for insecticidal testing. Compounds with nicotine and with arecoline were also prepared for the Bureau of Animal Industry to be tested as anthelmintics.

SYNTHETIC COMPOUNDS CONTAINING SULPHUR

Past work of the Insecticide Division and cooperating entomologists has shown that diphenylene sulphide has marked toxicity to a variety of insects, and indicates that this compound may become an important substitute for arsenical compounds. Considerable effort was spent on the problem of devising new methods of synthesis which will permit its more economical preparation in quantity.

During the year the three compounds diphenylene disulphide, phenothioxin, and phenothiazine were prepared because of their similarity to the previously

investigated diphenylene sulphide, diphenylene oxide, and carbazole. Tests by cooperating entomologists immediately revealed that phenothiazine is more toxic to mosquito larvae than rotenone, is quite effective against codling-moth larvae, and is also poisonous to several other varieties of insects, all indications pointing to its being primarily a stomach poison, and therefore just the type of material being sought as a substitute for lead arsenate. Phenothiazine is easily prepared by simply melting together diphenylamine and sulphur in the presence of aluminum chloride as a catalyst. Preliminary tests indicated that the compound was not toxic to foliage, and all points considered, this is a very promising insecticidal material.

SPRAY RESIDUES

At apple harvesting time, the division cooperated in an extended series of washing tests carried out in conjunction with the Bureau of Plant Industry. These studies included tests of various washing machines and various solutions, and a total of 913 samples were analyzed in duplicate. The most satisfactory procedures were found to be hydrochloric acid plus mineral oil in a brush-flood machine, and sodium silicate followed by hydrochloric acid in a double-process machine. The need for better washing solutions was made plainly evident. A special investigation was made of the solubility of cryolite in chemical solutions. The materials tested included hydrochloric, nitric, sulphuric, chromic, silicic, and boric acids; sodium hydroxide, sodium silicate, the chlorides of sodium, potassium, iron, and aluminum, the sulphates of copper, iron, aluminum, magnesium, zinc, and potassium; borax, sodium bicarbonate, etc. It seems definitely established that aluminum salts, ferric salts, and boric acid in the presence of hydrochloric acid improve the solubility, probably because of the formation of complex fluorine compounds, whereas sodium chloride, and other sodium salts repress the solubility, possibly because of the common ion effect.

FLUORINE-CONTAINING INSECTICIDES

Further preparative work was directed toward the making of the complex fluorides of iron and the alkali metals, insecticidal tests with which appear in the literature. White, finely divided powders were obtained whose composition agreed quite well for the formulas Na_3FeF_6 and K_3FeF_6 . The former proved to be soluble, at 21°C ., to the extent of 0.398 g/100 cc, the latter to the extent of 0.784 g/100 cc under the same conditions.

GRAIN FUMIGANTS

The Insecticide Division has continued to keep in touch with the fumigation of stored grain, in the development of which it has played a prominent part in the past.

Analyses of 19 commercial grain fumigants showed 7 to be mixtures of ethylene dichloride plus carbon tetrachloride, 3 consisted of propylene dichloride and carbon tetrachloride, 4 of carbon disulphide plus carbon tetrachloride in 2 of which some sulphur dioxide had been dissolved, 2 consisted mainly of chloropicrin, 1 of a mixture of ethylene oxide plus solid carbon dioxide, 1 of calcium cyanide, and 1 of sodium bicarbonate.

During the year information became available concerning the commercial use of methyl formate and ethyl formate, two fumigants which were discovered and initially developed in the Insecticide Division in cooperation with the Bureau of Entomology. Methyl formate is being used in conjunction with carbon dioxide, and according to reliable information one company has made at least one purchase of 50,000 pounds of methyl formate, representing 1,250,000 pounds of its finished fumigant. Ethyl formate has been commercially applied to the fumigation of cartons containing raisins.

MUSHROOM FUMIGANTS

The new type of sulphur burner mentioned in last year's report was completed and tested in a mushroom house of standard size at Avondale, Pa. It embodies the use of a fan to supply sufficient air to the sulphur, and proved very successful. Twenty-five pounds of sulphur burned in this new burner produced a higher concentration of sulphur dioxide than could be produced with 100 pounds of sulphur in the old-style burner.

Work was conducted in an experimental fumigatorium at Arlington Experiment Farm to determine the concentrations of sulphur dioxide required to kill

the important mushroom insects and mites at various temperatures in the range occurring during peak heat. It was found that 100-percent mortality of all mushroom insects and mites is produced by the use of a mean concentration of 8 mg per liter for 100 minutes at 100° F., and 4 mg per liter for 75 minutes at 120°. These concentrations may readily be produced by the sulphur burner previously described.

FUMIGATION OF SCALE INSECTS

This work has been directed toward finding the fundamental facts connected with the supposed development by citrus red scale in southern California of a resistance to fumigation with hydrocyanic acid that is rendering its control by this means more difficult and even impossible. This year's work has included many seasonal laboratory fumigations under controlled conditions to determine how the resistance of the various stages of scales changes from season to season; small-scale fumigatorium tests as a basis for comparison with other fumigants; tests of special hydrocyanic-acid applicators and of special tents for which superior performance is claimed; analyses of the air under the tents during commercial fumigations; and a special investigation of the phenomenon of protective stupefaction.

During the year, 162 compounds representing almost all classes of organic compounds have been tested in admixture with hydrocyanic acid by a standard procedure, but none proved particularly promising.

Also the efficacy of about 140 fumigants has been compared with that of hydrocyanic acid, special attention being paid to methyl thiocyanate and certain other thiocyanates and isothiocyanates. Methyl thiocyanate proved again this year to be about as toxic, mol for mol, as hydrocyanic acid, and was the only compound to compare at all favorably with that standard fumigant.

PREPARATION OF ARSENICAL INSECTICIDES

Until such time as nonpoisonous organic insecticides are developed to the stage at which they can displace arsenic compounds entirely, the latter will continue to be important and hence demand some chemical investigation. Because it contains a second poisonous element, namely, lead, it is particularly desirable to avoid the use of lead arsenate, and this work has for its aim the investigation of other arsenicals which might be used in its stead. The past year's work has dealt with the homologs of paris green, and with a renewed attempt to find the cause for the differing behavior of the various commercial calcium arsenates in their reaction toward plant and insect, an attribute that makes the use of calcium arsefate for many purposes rather uncertain. The particular problem of the relation of basic arsenates of calcium to plant burn and insect toxicity has been under study, but so far only the method of making products of predetermined basicity has been worked out, and experimental batches prepared for testing.

CONSULTING AND ANALYTICAL WORK

Two hundred and forty samples of miscellaneous insecticides were received from divisional field stations of the Bureau of Entomology. They consisted largely of arsenicals, fluorine compounds, and samples of derris and cubé which are being used by them in their regular insecticidal testing. There were also conducted for that Bureau a more extended investigation of the composition of a commercial insecticide which has proved to be a valuable attractant for the Mediterranean fruit fly; a study of the corrosion of galvanized-iron bait traps by the tartar emetic used in them; a similar investigation of the corrosive effect of a mixture of lime-sulphur and ferrous sulphate on brass and iron spray containers; and a detailed study of certain commercial mixtures of calcium arsenate and paris green to determine whether they contained, as a product of reaction during mixing, any copper arsenite to which their superiority over ordinary calcium arsenate could be attributed.

The analytical work performed for other units included the analysis of 74 samples of lead arsenate purchased on bid by the Bureau of Plant Quarantine; the examination for arsenic of 40 samples of chemical reagents submitted by another division of the Bureau of Chemistry and Soils; the examination of 2 samples of water and 1 of oil for the Food and Drug Administration; the analysis of 2 fly sprays from the Bureau of Prisons of the Department of Justice, and the determination of arsenic in samples of hair and cigars submitted by an army surgeon in a case of suspected arsenical poisoning.

Thirty-three scientific papers were published and five public-service patents were granted members of the Insecticide Division during the year. The monthly review of patents relating to pest control was issued in mimeographed form and copies sent to Federal and State entomologists and chemical manufacturers interested in insecticides.

DUST EXPLOSIONS INVESTIGATIONS

Twenty-four dust explosions were investigated during the year. These explosions resulted in the death of 20 persons, injuries to 46 others, and property damage amounting to \$1,327,200. They covered the following lines of industry: Grain handling, feed and cereal milling, fertilizer manufacture, malting, woodworking, cork grinding, manufacture of celluloid articles, and the handling of molding powder and aluminum dust.

The repeal of prohibition resulted in increased activities at malt houses, breweries, and distilleries. The handling of grain in these industries creates a dust-explosion hazard, and already two serious explosions have occurred. A fire captain was killed and 14 firemen were injured when an explosion occurred while they were fighting a fire in a Buffalo, N.Y., malt house.

ARLINGTON TESTS ON VENTING AREA

Research, particularly a study of the effect of location and distribution of vents and the relation of vent area to explosion pressure, was continued during the year. In addition to the regular study to determine the effective ratio of venting area to volume, some work was done with conveyor chokes, and the breaking strength of different types of glass when subjected to explosion pressures was determined.

An inert-gas-producing unit was obtained, set up, and connected during the year. Preliminary tests were made with this equipment to determine the effect of inert gas in preventing or retarding explosions in the experimental chamber.

During the year a number of dust-explosion demonstrations were given at the testing station. A series of tests were made for officials of the Navy Department to demonstrate the method of using vents to release explosion pressures without structural damage and to show the value of inert gas as a means of preventing dust ignitions. A somewhat similar series of tests was made for officials of the Department of Labor.

Tests were made during the year to determine the explosibility of sweet-potato starch and demonstrations given at the testing station for representatives of the Bureau and parties interested in the construction of plants to produce sweetpotato starch.

EXPLOSIBILITY OF MALT AND BARLEY ELEVATOR DUSTS

Within the past year the increase in production from malt houses and breweries has created a dust hazard that requires immediate attention. Samples of ground malt and malt and barley elevator dusts have been obtained and explosibility tests have been made to determine the maximum pressure produced, and the average and maximum rates of pressure rise for concentrations of dust in air ranging from 25 mg to 1,000 mg per liter, which is equivalent to 25 to 1,000 ounces of dust per 1,000 cubic feet. This information, together with the ignition temperatures of these dusts, will enable the Chemical Engineering Division to determine their relative fire hazard, and the precautions that must be taken to prevent explosions of these dusts.

The data previously reported on agricultural and other dusts have been arranged in manuscript form, to be submitted for publication as a Department bulletin.

OTHER FLAMMABILITY AND FIRE-HAZARD TESTS

The limits of flammability of propylene oxide in air were determined in an apparatus almost cubical in shape and having a capacity of 103.1 cubic feet, which approaches in size some of the apparatus used in fumigation work.

Two weed killers known as Sodium C2 and Calcium C2 were submitted to this laboratory by the White Pine Blister Rust Control Division of the Bureau of Plant Industry, and tests for drying-time and ignition-temperature determinations were made.

A comprehensive bibliography of weed killers has been prepared, with special reference to their chemical composition. The Bureau's interest in this matter pertains to the fire hazard inherent in a great many of these materials.

INDUSTRIAL-PLANT STUDIES

An inspection was made of the inert-gas equipment at one of the large feed-grinding plants. This system, installed to provide inert-gas protection against dust ignitions during feed grinding has been changed from time to time to overcome difficulties which have developed. It has served to a certain extent as a test unit for the inert-gas system of explosion protection developed in the Bureau. The present changes are designed to overcome the difficulty caused by corrosion of the piping due to the high sulphur content of the fuel used in the boilers from which the gas is drawn.

At the time this inspection trip was made several grain elevators at Omaha were inspected, and a study was made of the dust-explosion hazard in malt houses and breweries at Milwaukee, Wis.

A special survey of fire and explosion losses in country elevators was made during the year.

SCHOOLS OF INSTRUCTION FOR FIREMEN

The Bureau continued its cooperation with the States in presenting the dust-explosion prevention work to the firemen assembled at the instruction schools. The Third Annual Fire Service Extension School of West Virginia University at Morgantown, W.Va., was attended by a representative of the Bureau.

Dust explosions and spontaneous heating were discussed at the First Annual Fire Service Extension School of the Southwestern Pennsylvania Fire Chiefs' Association at the California State Normal School, California, Pa.

Two meetings were held in Buffalo, N.Y., for members of the fire department, and an address accompanied by motion pictures and dust-explosion demonstrations, was given to both officers and men.

FARM FIRES

EXPERIMENTAL WORK ON SPONTANEOUS IGNITION OF HAY

One large-scale experiment was carried on in the specially-constructed barn at Beltsville, Md., during the summer of 1933, with a total of 50,475 pounds of hay.

Six zones were established, and 32 thermocouples and 6 metal baskets were used. The false bottom used in the June 1933 experiment was again utilized. During the course of the experiment natural admission of air into the mow was varied by manipulation of the ventilator on the roof and of the vents along the alley. The hay was removed from the barn during the second week in October, all of it being weighed out and samples collected for analysis.

A striking observation was the extent to which the hay had dried out during the 4 months it had been in storage. This condition, together with the development of mold, especially at interior points, indicated that the false bottom was effective and a prime factor in aerating the mass.

Another large-scale experiment is in progress which is expected to yield results indicative of the possible efficacy of salt as a retardant or preventive of spontaneous heating.

4-H CLUB ACTIVITIES

The Division, in connection with the Extension Service, has developed programs of activities for 4-H clubs on farm-fire prevention. The State of Oregon undertook the first organized 4-H club work in this field, the campaign being initiated by the State fire marshal in cooperation with the Extension Service of Oregon State College, through the medium of the State 4-H club organization. A 4-H club project on rural fire prevention also has been inaugurated in Nebraska by the Agricultural Extension Service of the University of Nebraska in cooperation with the State fire marshal. The results of this campaign have been so gratifying that it is being continued in Oregon and Nebraska, and plans are under way for such activity in other States. The enrollment in this farm fire-prevention movement of 4-H club members, who usually are the outstanding boys and girls in their farm communities, and the carrying on of well-formulated intensive campaigns centering on farm properties, is bound to result in a greater reduction of farm-fire losses as the movement progresses and spreads.

VISUAL EDUCATIONAL ACTIVITIES

An exhibit for the State fair work portraying fire prevention was completed by the office of exhibits and shown at the Eastern States Exposition, Springfield, Mass.

Work was continued on the exhibits at the Century of Progress.

A large number of photographs were collected in the Bureau and assembled for dispatching to London, England, for display at the exhibition of the Royal Photographic Society of Great Britain.

An exhibit of hemlock bark for tanning was prepared for the Industrial Farm Products Division.

Plans were made for revision of the Bureau's exhibit at the 1934 Century of Progress. Part of the 1933 exhibit, such as the synthetic-ammonia plant model and converter, was returned to Washington and sent to the new Franklin Institute, Philadelphia, for display at the opening of the institute.

Exhibit material was forwarded to Winter Haven, Fla., for the Bureau's exhibit at the annual Florida Orange Festival.

The soil-erosion exhibits booth was sent to Columbus, Ohio, for display during farmers' week at Ohio State University.

Assistance was given in planning for the development of the soil-erosion train now under consideration by several railroads for exhibition throughout the soil-erosion sections of the United States.

SOIL INVESTIGATIONS

SOIL SURVEY

During the past fiscal year 19,399 square miles of rural lands in 26 States and Puerto Rico were mapped by the Soil Survey. This brings the total area covered by the Soil Survey considerably over 1,500,000 square miles. These maps furnish the fundamental groundwork for planning a land policy by the various governmental agencies, both local and national. The soil maps, together with the accompanying reports giving descriptions of the soils and other uses, provide farmers and land appraisers with a practical working handbook for the soil. In many cases these same maps include the only accurate base map showing the location of rivers, lakes, roads, schools, and the other natural and cultural features of the area.

It is well recognized that the maps of the Soil Survey furnish a sound basis for the development of land-use policies. In the State of New York, for example, the Soil Survey has been and is being used directly in connection with the general program of establishing rational policy for the use of land. In North Dakota this Bureau is engaged in making a comprehensive and detailed soil classification used directly as a basis for classification of lands for the purpose of appraisal for taxation. This work has been taken up at the insistence of the local governments in these areas and has extended already to three counties in North Dakota.

For the purpose of carrying out the Department's policy of removing land from the production of surplus crops, especially where these crops are produced only at a low labor income for the operator, the Soil Survey furnishes the necessary information required to readjust the use of these areas for other crops, grazing, or forestry.

In the Western States the soil survey is proving of incalculable value in the extension of the acreage of certain special crops and at the same time serves to point out the areas where the accumulation of salts and the development of alkali would be a menace to irrigation projects. The selection of those soils suitable for the production of cotton and those best adapted to other crops in southern areas infested with the bollweevil has been greatly expedited by the use of the soil maps. Land suitable for the production of high-quality tobacco is selected through the use of soil maps where they are obtainable.

Interpretation of experimental work in the use of lime, fertilizers, and other farm-management practices depends on the soil survey. Experimental results on one soil type may be applied to other areas of that same soil. Because of the exact descriptions and classification of soils contributed by the soil survey, it has become more and more the policy of experiment station workers and county agriculture agents to make their recommendations regarding agricultural practices by soil type.

During the past year the Soil Survey Division has compiled data giving a definite rating of the productive capacity of the principal soil types mapped for several States for the various crops commonly grown. Summary tables for the soils of each area are being prepared for immediate use, for reference, and for future publication. This work is of great value because it furnishes the natural and logical basis for land classification.

The character of the soil is the most important factor determining the appraisal of rural lands for taxation assessment and determining land values. The appraisers of the Federal land bank have made the utmost use of all available soil maps in carrying out the program of the Farm Credit Administration. Many branches of the Government make use of the soil-survey reports and the maps and are constantly calling on the soil-survey experts of the Bureau for detailed surveys of special areas.

Tables 2 and 3 show the details of the work done during the fiscal year 1934, the areas covered, and their distribution.

TABLE 2.—*Individual areas surveyed and mapped during the fiscal year ended June 30, 1934*

State or Territory	Area	Area surveyed	
		Square miles	Acres
Alabama.....	Colbert County.....	1 332	212, 480
	Hale County.....	1 176	112, 640
	Marion County.....	109	69, 760
	Sumter County.....	1 263	168, 320
Arizona.....	Casa Grande area.....	53	33, 920
California.....	Concord area.....	1 599	383, 360
	Visalia area.....	222	142, 080
Georgia.....	Toombs County.....	1 85	54, 400
Idaho.....	Bonner County.....	1 309	197, 760
Indiana.....	La Porte County.....	1 316	202, 240
	Steuben County.....	305	195, 200
Iowa.....	Audubon County.....	443	283, 520
	Davis County.....	1 84	53, 760
	Decatur County.....	56	35, 840
	Osceola County.....	283	181, 120
Kansas.....	Allen County.....	295	188, 800
Michigan.....	Cheboygan County.....	1 237	151, 680
	Ingham County.....	553	353, 920
	Oceana County.....	1 194	124, 160
	Saginaw County.....	1 137	87, 680
Minnesota.....	Kanabec County.....	1 369	236, 160
	Pine County.....	787	503, 680
Montana.....	Middle Yellowstone area.....	1 60	38, 400
Nebraska.....	Boyd County.....	1 474	303, 360
	Garfield County.....	357	228, 480
	Greeley County.....	571	365, 440
	Keyapaha County.....	1 673	430, 720
New York.....	Wheeler County.....	1 510	326, 400
	Albany-Schenectady Counties.....	298	190, 720
	Cattaraugus County.....	75	48, 000
	Onondaga County.....	453	289, 920
North Carolina.....	Otsego County.....	1 587	375, 680
	Ulster County.....	563	360, 320
	Wyoming County.....	1 370	236, 800
	Cartaret County.....	171	109, 440
North Dakota.....	Jones County.....	1 199	127, 360
	Pamlico County.....	350	224, 000
	Stokes County.....	300	192, 000
	Billings County.....	566	362, 240
Ohio.....	McKenzie County.....	1 35	22, 400
	Morton County.....	656	419, 840
Oklahoma.....	Logan County.....	1 265	169, 600
	Alfalfa County.....	1 275	176, 000
	Choctaw County.....	88	56, 320
	Garfield County.....	354	226, 560
Oregon.....	Major County.....	122	78, 080
	Murray County.....	153	97, 920
	Pontotoc County.....	315	201, 600
	Tulsa County.....	355	227, 200
Pennsylvania.....	Washita County.....	1 153	97, 920
	Umatilla County.....	1 199	127, 360
Puerto Rico.....	Bucks County.....	79	50, 560
	Huntingdon County.....	629	402, 560
Rhode Island.....	Soil Survey of.....	1 309	197, 760
	Kent and Washington Counties.....	1 242	154, 880

¹ These figures do not include portions of these areas surveyed in preceding years.

TABLE 2.—*Individual areas surveyed and mapped during the fiscal year ended June 30, 1934—Continued*

State or Territory	Area	Area surveyed	
		<i>Square miles</i>	<i>Acres</i>
South Carolina.....	Edgefield County.....	¹ 201	128, 640
	Pickens County.....	186	119, 040
	Sumter County.....	¹ 199	127, 360
Texas.....	Brown County.....	¹ 645	412, 800
	Fannin County.....	134	85, 760
	Hunt County.....	¹ 484	309, 760
	Maverick County.....	57	36, 480
	Williamson County.....	¹ 310	198, 400
	Zavala County.....	¹ 528	337, 920
Utah.....	Price area.....	78	49, 920
Virginia.....	Albemarle County.....	311	199, 040
	Halifax County.....	¹ 504	322, 560
	Southampton County.....	¹ 21	13, 440
West Virginia.....	Pocahontas County.....	¹ 186	119, 040
Wyoming.....	Uinta County.....	¹ 461	295, 040
Total.....		21, 318	13, 643, 520

¹ These figures do not include portions of these areas surveyed in preceding years.

TABLE 3.—*Areas surveyed and mapped in the several States during the fiscal year ended June 30, 1934, and the areas previously reported*

DETAILED

State or Territory	Work during 1934	Work previously reported	Total	
			<i>Square miles</i>	<i>Acres</i>
Alabama.....	880	58, 006	58, 886	37, 687, 040
Arizona.....	53	4, 083	4, 136	2, 647, 040
Arkansas.....		15, 547	15, 547	9, 950, 080
California.....	821	34, 811	35, 632	22, 804, 480
Colorado.....		5, 865	5, 865	3, 753, 600
Connecticut.....		1, 704	1, 704	1, 090, 560
Delaware.....		2, 276	2, 276	1, 456, 640
Florida.....		15, 160	15, 160	9, 702, 400
Georgia.....	85	35, 862	35, 947	23, 006, 080
Idaho.....	309	12, 003	12, 312	7, 879, 680
Illinois.....		6, 770	6, 770	4, 332, 800
Indiana.....	621	20, 418	21, 039	13, 464, 960
Iowa.....	866	48, 468	49, 334	31, 573, 760
Kansas.....	295	16, 346	16, 641	10, 650, 240
Kentucky.....		5, 542	5, 542	3, 546, 880
Louisiana.....		17, 431	17, 431	11, 155, 840
Maine.....		2, 197	2, 197	1, 406, 080
Maryland.....		13, 959	13, 959	8, 933, 760
Massachusetts.....		8, 811	8, 811	5, 639, 040
Michigan.....	1, 121	30, 948	32, 069	20, 524, 160
Minnesota.....	1, 156	11, 085	12, 241	7, 834, 240
Mississippi.....		30, 740	30, 740	19, 673, 600
Missouri.....		37, 177	37, 177	23, 793, 280
Montana.....	60	3, 227	3, 287	2, 103, 680
Nebraska.....	2, 585	62, 833	65, 418	41, 867, 520
Nevada.....		652	652	417, 280
New Hampshire.....		1, 411	1, 411	903, 040
New Jersey.....		9, 895	9, 895	6, 332, 800
New Mexico.....		2, 565	2, 565	1, 641, 600
New York.....	2, 346	32, 085	34, 431	22, 035, 840
North Carolina.....	1, 020	46, 312	47, 332	30, 292, 480
North Dakota.....	1, 257	19, 690	20, 947	13, 406, 080
Ohio.....	265	18, 142	18, 407	11, 780, 480
Oklahoma.....	1, 815	20, 485	22, 300	14, 272, 000
Oregon.....	199	15, 600	15, 799	10, 111, 360
Pennsylvania.....	708	21, 325	22, 033	14, 101, 120
Puerto Rico.....	309	1, 791	2, 100	1, 344, 000
Rhode Island.....	242	1, 281	1, 523	974, 720
South Carolina.....	586	25, 939	26, 525	16, 976, 000
South Dakota.....		8, 286	8, 286	5, 303, 040
Tennessee.....		11, 198	11, 198	7, 166, 720
Texas.....	2, 158	62, 100	64, 258	41, 125, 120
Utah.....	78	2, 419	2, 497	1, 598, 080
Vermont.....		1, 175	1, 175	752, 000
Virginia.....	836	13, 237	14, 073	9, 006, 720

TABLE 3.—Areas surveyed and mapped in the several States during the fiscal year ended June 30, 1934, and the areas previously reported—Continued

DETAILED—Continued

State or Territory	Work during 1934	Work previously reported	Total	
	Square miles	Square miles	Square miles	Acres
Washington.....		10,752	10,752	6,881,280
West Virginia.....	186	23,497	23,683	15,157,120
Wisconsin.....		26,659	26,659	17,061,760
Wyoming.....	461	9,468	9,929	6,354,560
Total.....	21,318	887,233	908,551	581,472,640

RECONNAISSANCE

Alaska.....		31,915	31,915	20,425,600
Arkansas-Missouri.....		58,000	58,000	37,120,000
California.....		32,135	32,135	20,566,400
Kansas.....		39,960	39,960	25,574,400
Michigan.....		1,322	1,322	846,080
Minnesota.....	994	10,080	11,074	7,087,360
Montana.....	151	49,534	49,685	31,798,400
Nebraska.....		53,064	53,064	33,960,960
North Dakota.....		39,240	39,240	25,113,600
Ohio.....		41,420	41,420	26,508,800
Pennsylvania.....		41,405	41,405	26,499,200
South Dakota.....		41,400	41,400	26,496,000
Texas.....		152,855	152,855	97,827,200
Vermont.....		9,124	9,124	5,839,360
Washington.....		16,540	16,540	10,585,600
Wisconsin.....		14,425	14,425	9,232,000
Total.....	1,145	632,419	633,564	405,480,960

WORK FOR SUBSISTENCE HOMESTEADS

Since August 1933, soils have been mapped by this Bureau for the Subsistence Homesteads Division of the Department of the Interior in connection with the following projects: Three projects in the vicinity of Birmingham, Ala.; the Westmoreland project near Greensburg, Pa., and contemplated projects near Irvona and Coalport. In West Virginia the soils on two projects were examined—the Arthurdale Homestead at Reedsville and the Tygart Valley project about 10 miles south of Elkins. In Tennessee, a 10,000-acre tract of land was purchased after examinations had been made on several large tracts. This project is situated on the Cumberland Plateau. In North Carolina a 10,000-acre tract was examined and an appraisal was made of the land. In South Carolina, three tracts were examined. In Mississippi small acreages were examined near Tupelo, Meridian, Hattiesburg, and McComb, and a large acreage near Richton.

From November 1933 to March 1934, eight tracts of land in Florida were examined to determine their suitability for subsistence homesteads. Detailed soil maps were made of the areas in Volusia and Liberty Counties.

ASSISTANCE TO VARIOUS GOVERNMENT AGENCIES

In addition to the mapping of soils for the subsistence homesteads, a large area in the vicinity of Monticello, Ga., also has been mapped in detail for the Bureau of Agricultural Economics. Another large area was mapped in detail in the vicinity of Beltsville, Md., for the Bureau of Animal Industry and for other bureaus in the Department of Agriculture.

Services of Soil Survey men have been used on the Crow irrigation project in Montana, and Fort Hall irrigation project in Idaho. Another special assignment was to the San Carlos project in Arizona. The War Department and Bureau of Agricultural Economics called on this Bureau to pass on the character and value of the soils in the Fort Peck Reservoir, Mont. The Tennessee Valley Authority used a soil expert for classification and general mapping of the soils on the Norris town site located near the Clinch River. The Public Health Service, Department of Treasury, called on the Bureau to pass on certain lands for proposed hospital sites in Washington and Oregon.

From December 1933, through April 1934, a majority of the Bureau's soil scientists were engaged in the supervision of large parties of Civil Works employees distributed in several States. This work consisted of making of base maps of a number of counties in 10 of the Southern States.

PEAT INVESTIGATIONS

The Section of Peat Investigations has continued its research and cooperation with other bureaus and State agencies with the object of locating and developing the vast domestic deposits for use in agriculture and industry. One outstanding objective of this work is to assist the American peat industry, consisting of peat producers in 17 States, to secure and market products of such grade and quality as to replace the imported peat products for which approximately \$800,000 is now expended annually.

During the past year the Section has identified and graded samples of peat and muck submitted for analysis by Federal, State, and private agencies; has advised correspondents and consultants regarding peat products, and the nature of peat deposits; has cooperated with the Soil Survey and the Insular Experiment Station of Puerto Rico in the study of tropical maritime types of peat land, and with the Office of National Parks and the Golf Association in determining the relative merits of different kinds of peat for improving mineral soils.

LOCATION OF SELENIZED AREAS

During the summer of 1931 the Soil Survey made a study in parts of South Dakota, Nebraska, and Wyoming to determine what relation, if any, existed between the diseased condition of livestock and the different soils. In the entire area surveyed the trouble occurred on soils of a certain group or could be attributed to hay or grain grown on these soils. These soils were heavy clays derived from dark-colored cretaceous shales.

During the field seasons of 1932 and 1933, the Soil Survey has attempted to determine the distribution of the diseased condition and the extent of the areas of possible occurrence. Exploratory trips have been made to outline the extreme limits of the affected areas and detailed surveys of farms and other areas to learn more of the local distribution of the causal toxic element, selenium. The information in both classes of surveys has been gained by collecting samples of soil, of the underlying shale, and of the plants growing on the soils and sending them to the chemical laboratories for determination of their selenium content.

SOIL-EROSION INVESTIGATIONS

The work of the Bureau on soil and water conservation at its 10 soil-erosion experiment stations located in as many of the most seriously affected type areas scattered widely over the country has continued essentially along the lines set forth in earlier reports. As in the past this, of course, has been in close cooperation at all times not only with appropriate State and Federal agencies but with numerous others of a more local nature. During the year these stations have furnished much constructive information not only direct to the public at large but also to various service organizations both for direct application in the field and for systematic extension activities by way of ultimately getting the story across to the farmer in an effective manner.

This information has dealt not only with the relative rates of soil and water losses from various soils under definite conditions of slope, climatic relations, and surface exposure, but also has included well-defined instructions as to procedure in the establishment of proper methods of control under practical working conditions in the field.

The work as a whole has continued to show rather well-defined physical relations between established soil types and erosional behavior and thus, in a very definite way, emphasizes the importance of study and classification of soils from the type standpoint to the accomplishment of most effective and systematic work in this important field of conservation.

VEGETATION A DOMINANT FACTOR IN EROSION CONTROL

The dominant role of vegetation as a controlling factor in soil and water losses, whether it be grass, close-growing cover crops, shrub, or forest cover has continued to stand out prominently as in previous years. Control studies at all of the erosion stations involving plots of about one-hundredth acre in

size where all soil and water losses are caught and measured under a variety of surface exposures as to crop and cultivation have continued to provide remarkably interesting and important results during the past year.

Thus at the Temple (Tex.) station a study of the results of the variously treated plots shows that permanent sod not only did not lose either water or soil at any time during the past year with a rainfall of 25.68 inches, but it has not experienced run-off or loss of soil at any time the past 4 years with an average rainfall of 28.78 inches. In contrast with this the plot involving a standard rotation of corn, oats, and cotton suffered water losses under the conditions indicated at an average annual rate of 8.73 percent of the total rainfall and an average annual soil loss of 7.83 tons. These results were obtained in working with the local Houston black clay soil on a slope of 4 percent. Both sheet and gully erosion are locally very severe on slopes of this or even lesser degree under average field conditions in this section, where no control is exercised. Other soils and slopes have shown even more striking comparisons, although in no instance has the grass cover exerted such complete control as is indicated at the Temple station.

At the Guthrie (Okla.) station a similarly established grass plot upon Vernon fine sandy loam with a slope of 7.7 percent gave an average annual loss over a period of 4 years of 1.5 percent of an average annual rainfall of 32.9 inches, while the plot carrying continuous cotton showed a loss of 14.2 percent. Comparing the two plots in a similar way from the standpoint of soil losses, that in continuous grass experienced an average annual loss of 80 pounds per acre as against more than 28 tons for the cultivated plot.

Control plots of a similar nature established under various conditions of forest growth at certain of the erosion stations have also demonstrated the remarkable degree of control this type of cover exerts over soil and water losses especially when undisturbed by burning. Thus, studies at Guthrie on Vernon fine sandy loam with a slope of 5.1 percent have shown that while the average annual loss over a period of 4 years from a rather lightly covered area has been but 0.13 percent of an average rainfall of 33.49 inches, it was increased by nearly 40 times through annual burning over. Likewise the average soil loss for the same period has been increased by 12 times as a result of the exposure under such lightly wooded conditions following burning. The average annual loss of soil for the period from the undisturbed plot was 40 pounds per acre.

Highly effective control measures of this nature are being introduced into many of the emergency-work programs where gully control is the major aim in most instances. In this work extensive use is being made of grass and legume seedlings following the building of the check dams and the grading down of the sides of the banks. This work of the Civilian Conservation Corps is under the immediate supervision of the Forest Service with the close cooperation of the Bureau of Chemistry and Soils and of the Bureau of Agricultural Engineering.

STRIP CROPPING AND CONTOUR CULTIVATION

Under natural conditions of cultivation strip cropping or the alternation of close-growing crops such as alfalfa or sorghum with cultivated crops such as corn or cotton, in strips of definite width, depending on the degree of slope and other factors, have continued to show highly interesting possibilities for erosion control, wherever carefully studied. The procedure of course falls within the limitation of availability of desirable crops for a given soil, locality, and type of farming, as well as the seasonal exposure involved during periods of seeding.

Substantiating results also have followed those of previous years in the use of improved methods of contour cultivation of various types both with and without terraces. As might be expected, results with terraces in general point toward improvement as the structures settle and cropping relations become better adjusted. Procedure along this line whether it be terracing, contour cultivation, or a combination of the two represents an attempt to build up basin capacity at the surface of the soil to prevent or control run-off of the water and, at the same time, wash-off of the soil.

A COMBINATION OF PREVENTIVE MEASURES NEEDED

It is readily seen that a definite knowledge of the sum of the basin capacity in inches of rainfall of the surface conformation of a soil developed by a given

type of cultivation or treatment and the rate of infiltration of water into the soil under those conditions represents a factor of considerable importance in run-off and erosion control, since the difference between this value and the total rainfall must represent the amount that will run off the surface and not only be lost to plant growth, but also cause erosion unless the surface of the soil is properly protected.

While striking results have been obtained in the control of soil and water losses through the proper use of vegetation and by terracing and other mechanical means in a more or less independent way, it is coming to appear that a combination of these facilities may prove more advantageous and effective in the long run, especially in that complete dependence is not placed on either, alone, over any considerable period. It is planned that more and more emphasis will be placed upon combination studies of this type.

SOIL-FERTILITY INVESTIGATIONS

The soil-fertility investigations of the Bureau have continued to aid farmers in obtaining more economical production by evaluating the fertility of the principal soil types on which our major crops are produced and by determining their plant-food requirements. This work applies directly to cotton, potatoes, sugarcane, sugar beets, truck crops, citrus fruits, and nut crops, and is carried on in regional field headquarters in cooperation with State agricultural experiment stations.

COTTON SOIL-FERTILITY STUDIES

For the benefit of the cotton farmers of North Carolina, South Carolina, Georgia, Alabama, Texas, and Virginia, who desire to make the most effective and economical use of fertilizers, the Bureau has compiled data, following years of cooperative field experiments, which show the amounts and the mixtures of fertilizer that are best suited to the principal cotton-growing soils of these States.

The results obtained by this Division show that nitrogen is the predominant need of the cotton-growing soils of the Southeast and that in this region the yield of cotton may at least be doubled and sometimes trebled through the application of large quantities of commercial nitrogen mixed with mineral fertilizers.

The results of these experiments, which have been carried on for a number of years in North Carolina, South Carolina, and Georgia, are presented in Technical Bulletin No. 452, now in press. Farmers on the most extensive cotton-growing soils of the coastal plain and piedmont sections of those States can now secure additional reliable information relative to the most desirable nitrogen ratios, sources of nitrogen, and time of application on these soils.

Results of previous work showing the ratios of nitrogen, phosphoric acid, and potash which give the largest returns on the principal soil types used for cotton have also been published by the Bureau in Technical Bulletin No. 225.

Changes in the composition of commercial fertilizers are tending to increase their acid-forming property. To study this factor in relationship to cotton production the Bureau has begun a series of experiments to evaluate the effect of acid and neutral fertilizers on some of the most important soil types used for cotton growing.

POTATO SOIL-TYPE INVESTIGATIONS

During the past fiscal year cooperative potato-fertilizer studies were conducted on important soils in Maine, New York (Long Island), New Jersey, Pennsylvania, Virginia, Michigan, and Ohio. In these regions the use of commercial plant food is fully recognized as an essential practice in successful potato production, just as much as good soil preparation, good seed, and good cultural care are considered essential. As a matter of fact, proper feeding of the potato crop to obtain increased yields and better quality is a decided economy in that the extra return more than compensates for the cost of the fertilizer applied and results in lower unit cost of production.

The Bureau's cooperative fertilizer studies on potato soils have led to some interesting findings, among which may be mentioned the importance of plant-food elements other than nitrogen, phosphorus, and potassium in the nutrition of the potato. It has been found, for example, that magnesium must be present in sufficient amount in the soil or the potato plants will suffer from lack of green coloring matter or chlorophyll. The results so far secured show

that the addition of suitable magnesium compounds to the fertilizer or direct application of magnesium limestone to the soil overcomes the deficiency trouble, assuring normal growth and yields.

Continued studies to determine the need for uncommon elements, such as copper, manganese, nickel, and zinc, were made on Caribou loam, in Maine, and Sassafra loam, in New Jersey, without any significant response being obtained. The addition of nickel sulphate definitely resulted in injury, particularly so where an application of as much as 50 pounds per acre was made.

SUGARCANE SOIL AND FERTILIZER STUDIES

Substantial increase in the yields of different varieties of sugarcane resulted from the Bureau's work in determining and applying the most effective fertilizers for different varieties and different soils in Louisiana in cooperation with the experiment station of that State.

A very high yield resulted from a triangle fertilizer experiment at Jeanerette from an application of a 16-4-0 mixture at the rate of 300 pounds an acre (equivalent to 48 pounds of nitrogen and 12 pounds of phosphoric acid) which produced 42 tons of cane. This experiment on Iberia silt loam resulted in an increase of over 13 tons of cane in comparison with the unfertilized plots.

A yield of 29 tons of cane and 5,288 pounds of sugar per acre was obtained at Raceland with variety P.O.J. 213 first stubble on Yazoo very fine sandy loam. An almost unprecedented increase of 14 tons of cane and 2,431 pounds of sugar per acre was made over the unfertilized plots by applying 60 pounds of nitrogen in the form of sulphate of ammonia. This increase represents an increased return of more than \$50 per acre over the unfertilized plots.

In these and various similar experiments on a variety of soils, the most effective fertilizer was determined by the triangle or fertilizer-ratio system devised by this Bureau and used for many years in connection with Federal and State cooperative projects.

The field studies are being supplemented by laboratory work on the cane juice from the fertilizer plots to determine the composition of the juice as affected by different fertilizers, soil types, and varieties. The composition of the juice affects markedly the clarification methods and the manufacturing costs of sugar.

FERTILIZER STUDIES WITH SUGAR BEETS

Experiments with sugar beets carried on by the Bureau near Scottsbluff, Nebr., have shown that a moderate application of phosphatic fertilizer frequently more than doubles yields on certain types of soil with high soluble salt, or alkali, content. These soils in the past were not used for growing beets because of low yields but as the result of studies of the Bureau, can now be brought into profitable production.

During the fiscal year 1934, 3 subprojects were completed in the Red River Valley of North Dakota, 3 in southern Minnesota, and 5 in Nebraska. The work in Nebraska was conducted in cooperation with the Nebraska Agricultural Experiment Station. The information afforded by these experiments is of practical benefit to sugar-beet growers and sugar companies in the several States.

STUDIES WITH CONCENTRATED FERTILIZERS

Field experiments comparing single-, double-, and treble-strength fertilizer mixtures in Aroostook County, Maine, have shown that double-strength mixtures in particular rate as efficiently as ordinary mixtures so far as yields are concerned. The treble-strength mixtures, while having proved worth while from a plant-food standpoint, present certain physical difficulties which will have to be overcome before they can be fully recommended to fertilizer consumers. It has been indicated from the work that certain elements other than nitrogen, phosphorus, and potassium may be required, particularly magnesium, which the treble-strength fertilizer fails to carry in sufficient quantity for proper plant development. This can be met by the addition of available magnesium compounds to the fertilizer, or by direct applications of dolomitic limestone to the soil.

Field work comparing methods of applying concentrated fertilizer to potatoes has shown that applying fertilizer on each side of the seed piece in narrow bands at a distance of 2 inches from the seed piece gave best results. It was

found that an increase in yield of 30 to 50 bushels resulted over fertilizer applications under or over the seed piece. A comparison of single- and double-strength fertilizer in Maine, New Jersey, and Virginia has shown that on the lighter soil types in Virginia the chance for injury from concentrated fertilizer is greater. For this reason proper application of concentrated fertilizers has been found important.

Work with concentrated fertilizers in the Southern States includes experiments with truck crops and cotton in North Carolina, cotton in South Carolina and Georgia, and citrus and truck crops in Florida. The year's work confirmed the results of previous years in showing that concentrated fertilizers must be used cautiously and application made so as not to injure seed, which is best done by side placement of the fertilizer in relation to the seed.

Concentrated fertilizers are made more efficient on some soils by blending with the fertilizer small quantities of manganese, copper, nickel, and zinc salts, and by including appreciable quantities of calcium and magnesium compounds.

Valuable information has been secured in the study of concentrated fertilizers blended with minor essential plant foods, as affecting growth and production of sweetpotatoes on Norfolk loamy sand. The results secured confirm those of previous years in showing that the reinforcement of concentrated fertilizers with calcium, magnesium, and other of the less common plant foods, such as manganese, zinc, copper, nickel, etc., has made them more efficient for sweetpotatoes on these sandy soils. The results secured in this experiment, which is made on the same plots year after year, are more accentuated each year.

Experiments with the placement of concentrated fertilizers in relation to the position of the seed are in progress with potatoes on Bladen sandy loam at Aurora, N.C., and on Portsmouth sandy loam, Beaufort, N.C. These fertilizers give best results when the fertilizers are placed to the side of the seed and slightly below the level of the seed. This placement results in better stands and larger yields and renders concentrated fertilizers as efficient as ordinary-strength fertilizers.

Six years' results have been secured in studying effects of concentrated fertilizers on oranges in experiments at Lake Alfred, Fla., in cooperation with the Florida Agricultural Experiment Station. In the experiments where concentrated fertilizers are compounded from pure chemicals and compared with a fertilizer made partly from organic materials, tree condition is better and fruit of a higher quality from base-forming mixtures. These experiments are still in progress.

COTTON ROOT-ROT INVESTIGATIONS

Systematic experiments on the relation of soil-fertility factors and the use of fertilizers to the control of cotton root-rot have been continued in the Blackland Prairie area of Texas. These experiments, located on the major soil types in 9 counties of the area, have been conducted in cooperation with 11 representative cotton growers and with Federal and State field stations. Recent results confirm those of preceding seasons in indicating that fertilizers containing suitable ratios of readily available nitrogen and phosphoric acid accelerate growth and fruiting of cotton and increase yields of crop. These effects vary in degree with the soil type and with the season; but they are in general of such magnitude as to be important in the evasion and compensation of losses otherwise caused by the root-rot disease.

Further experimental evidence indicating a direct influence of fertilizer treatment on the rate of plant mortality due to the root-rot fungus has been accumulated. The effect varies with different soils. Consistent and significant reductions in the rate of dying of cotton plants have followed moderate applications of nitrogenous fertilizers on Wilson clay loam; similar effects have followed heavy fertilizer treatments on Wilson clay and Denton clay; and, on Houston soils, reductions in plant mortality have been effected by application of nitrogen fertilizers to cotton following sorghum crops. The effects are in a measure cumulative. Practical application of the results suggest a profitable return in cotton production through appreciable control of the root-rot disease.

Preliminary experiments furnish evidence that the lowered rates of plant mortality, associated with nitrogenous fertilizer treatments on certain root-rot infested soils, are correlated with significant differences in the content and distribution of carbohydrate materials within the plant. Other studies reveal that, in some cases at least, heightened nitrifying power of the soil accompanies treatment with a fertilizer found effective in reducing killing of plants

by root rot, and suggest that enhanced activity of soil organisms, other than the root-rot fungus, is another factor in the suppression of the disease under such conditions.

Experiments with midsummer deep tillage and subsoiling continue to demonstrate their effectiveness in land preparation and reducing root-rot losses the following season to a very low level.

FERTILIZER INVESTIGATIONS WITH PECAN SOILS

Soil-fertility studies in pecan orchards of the Southeastern States indicate that commercial production of good-quality pecans cannot be maintained on the soils of this region without making liberal applications of complete fertilizers relatively high in all the essential plant-food elements; without incorporating a large supply of organic matter in these soils regularly; and that due to the rather common occurrence of short periods of drought at critical times in the development of the pecan, it is very essential to conserve soil moisture in every way economically possible.

A cooperative experiment with the Bureaus of Plant Industry and Entomology, in which old, undernourished, and badly rosetted pecan trees were well fertilized, treated with zinc sulphate, sprayed for insects and diseases, and supplied with organic matter through legume cover crops, has resulted in an apparent recovery from the rosette, in renewed growth of the trees and in a heavy set of pecans this year for the first time in several years.

SOIL-FERTILITY INVESTIGATIONS WITH PEACHES

The Bureau's fertilizer work with peaches was inaugurated in field experiments at Marshallville, Ga., in 1922, on Greenville sandy loam, a coastal-plain soil, in cooperation with the Georgia Experiment Station.

The results of this experiment, which was continued 5 years, showed a fertilizer mixture containing 4 percent of nitrogen, 8 percent of phosphoric acid, and 8 percent of potash gave best yields of peaches and fruit that remained firm when shipped. Potash was a factor in producing peaches of good shipping qualities.

In 1926 an experiment using a similar plan (triangle fertilizer mixtures) was made on Cecil clay loam, a piedmont soil at Williamson, Ga. This experiment also showed the 4-8-8 fertilizer gave good tree growth and peaches of good quality.

CITRUS AND TRUCK-CROP FERTILIZER RESEARCH

The Bureau's investigations of citrus-soil problems comprise a series of experiments to determine the extent of manganese deficiency of citrus soils of Florida, the causes of bronzing of citrus and means of overcoming this destructive nutritional disease, and a series of experiments to study the best means of utilizing new chemical fertilizers. In the last-named studies, fertilizers are compounded to be acid forming and base forming, and these are used on citrus soils of varying degrees of soil reaction.

The results secured contribute to the knowledge of the judicious use of fertilizer and soil amendments in the economical production of citrus fruits in Florida. Orange trees on acid soils when fertilized with acid-forming concentrated fertilizers generally did not give as good yields, nor as heavy and firm fruit as when fertilized with base-forming concentrated fertilizers. While base-forming fertilizers gave larger yields and firmer fruit on acid soils, its superiority was not so marked on alkaline soils. The effect of manganese sulphate added to Florida citrus soils of acid and alkaline reaction were, in general, to increase the manganese content, the firmness and weight of the fruit, and color intensity of the rind of the fruit. The percent of juice in the ripe fruit was in most of the experiments decreased, but the degree of acidity of the fruit was apparently not effected. Manganese sulphate applied to soils of chlorotic groves improved the condition of the trees, and in many experiments chlorosis was reduced as evidenced by the greener leaf color. This effect was most marked on the neutral and alkaline soils, and occasionally noted on acid soils.

In the experiments to determine the cause of bronzing of citrus, a comparatively new nutritional disease, trees to which ground limestone, dolomitic limestone, magnesium sulphate, and ground limestone with manganese sulphate were added, in addition to complete fertilizer, showed earlier indications of improvement.

GREEN-MANURE CROPS

Since the establishment of the soil-fertility laboratory and the inauguration of green-manure studies at the experiment station at Pontiac, S.C., near Columbia, considerable information has been obtained which has proved helpful in growing crops economically on the light sandy soil at the station. The soil at the station is representative of a typical soil formation occurring extensively in North Carolina, South Carolina, and Georgia, the so-called "sand-hill country."

For maintaining the fertility of sand-hill soils the work of the Bureau shows that the soil should be kept in a crop both winter and summer. It has, moreover, proved more profitable, and soil fertility is maintained at a higher level, to apply periodically a high-nitrogen commercial fertilizer and harvest the crops than to use either no fertilizer or a low-grade nitrogen fertilizer and turn under the green-manure or hay crops.

STRAWBERRY-SOIL INVESTIGATIONS

Results of fertilizer experiments on the strawberry soils of eastern North Carolina show more vigorous plants, better plant viability, larger yields, and better strawberries from the use of a fertilizer containing 5 percent of nitrogen, 8 percent of phosphoric acid, and 6 percent of potash, when applied semi-annually at the rate of 750 pounds per acre in August and November. Fertilizers with lower or higher percentages of nitrogen and lower or higher percentages of potash than indicated above did not give as favorable results.

The viability of strawberry plants was found to be correlated, in a general way, with the reaction of the soils. Fields where strawberry plants died were found to be more acid than nearby fields with vigorous plants. When the soil was made more acid by the addition of sulphur, the viability of the strawberry plants decreased. On acid soils treated with lime the viability of strawberry plants increased as the soil approached neutrality up to a pH of about 6. The periodic addition of small quantities of lime and the use of physiologically alkaline fertilizers proved to be a means of preventing loss of strawberry plants on the more acid soils.

MECHANICAL PLACEMENT OF FERTILIZERS

The fertilizer-placement experiments in the South are in cooperation with the agricultural experiment stations of South Carolina, North Carolina, and Florida, and the Bureau of Agricultural Engineering. Work is in progress with cotton on three soil types at Florence, Columbia, and Clemson College, S.C.; with potatoes at Beaufort and Aurora, N.C.; and with beans at Winter Garden and Fort Lauderdale, Fla. The results for the year ended June 30, 1934, confirm those secured in previous years in showing that, in general, the preferred placement of fertilizers for cotton and truck crops is in a narrow band on each side and below the level of the seed.

The results of cooperative fertilizer placement studies on prominent potato soil types in Maine, Michigan, New Jersey, Ohio, and Virginia during the crop season of 1933 are also in harmony with those of other years. In general, best stands and yields were obtained when the fertilizer was applied in narrow bands on each side of the seed piece with approximately 2 inches of fertilizer-free soil intervening. Placement of fertilizer over or under the seed piece failed to give as satisfactory results as the side-placement methods.

SOIL-TYPE RESPONSES TO MAGNESIUM COMPOUNDS

The magnesium field studies in 1934 were conducted cooperatively in Maine, on Caribou loam; in New York (Long Island), on Sassafras loam; in New Jersey, on Sassafras loam; and in Virginia, on Norfolk sandy loam. In Maine and Virginia striking results were obtained by applying available magnesium compounds with the fertilizer. Normal vine development and yields ensued, in some cases 50 to 75 bushels increase being recorded. The quantity of magnesium to apply varied from 20 to 30 pounds of MgO per acre. It was found that a practical solution lies in applying dolomitic limestone, provided the deficiency is not acute. The relation of soil acidity to the general problem resolves itself again into the use of dolomitic limestone as a correction therefor and to automatically supply some magnesium. Analytical data are being accumulated on foliage and tuber samples from differently treated plots. A

continuation of the magnesium work is in progress to determine comparative value of different sources of magnesium and their effect on growth and yield.

BIOCHEMICAL SOIL STUDIES

Additional data on the occurrence of sterols in soil-forming fungi have been obtained.

Further work has been done in an attempt to distinguish between the CO_2 derived from uronic acids and that derived from other organic sources.

It has been found that practically all soils when boiled for some time with water give off CO_2 , and it has been found that this CO_2 arises from some more or less complex carbonate compound or compounds. The presence of such compounds in soils has not been recognized heretofore and a recognition of their presence introduces a new factor of far-reaching importance into the biochemistry of soils.

Data on the carbon-nitrogen ratio have continued to be collected in connection with all routine analyses of soils submitted to the laboratory.

SOIL CHEMISTRY AND PHYSICS

During the past year a new line of investigation has been added to the activities of the Division of Soil Chemistry and Physics. It concerns the occurrence and the importance of selenium in soils and vegetation. This investigation is carried on in cooperation with the College of Agriculture of South Dakota. A so-called "alkali disease" of animals in this section was first recognized by an Army surgeon in 1856. For many years it was supposed to be caused by alkali water. It is a matter of scientific interest that a trouble reported in 1856 should find scientific explanation only in 1934. The investigations of the South Dakota institution traced the cause of the animal disease to feed crops grown on certain localized soil areas. This Bureau has shown that the soils and vegetation contain appreciable quantities of the relatively rare element selenium, and that toxicity is associated with the selenium content.

Very delicate and satisfactory methods have been developed for the determination of selenium in soils and in vegetation. By the application of these methods the presence of selenium has been traced from animal to plant, from plant to soil, and from soil to parent shales. An extensive program is now under way which includes chemical analyses of soils and plants and the mapping of soil areas according to their selenium content. It is hoped that in this way the specific areas affected may be differentiated from unaffected areas which in many cases may be located close by.

It is a matter of particular importance that so far as known the affected areas all lie in a region of relatively low rainfall. The occurrence of selenium in soils or shales has been shown to be very wide and to include areas of limited extent in several States. Whether toxic quantities exist in more than four States is not known. Considerable variation in the selenium content of different plants grown on the same areas has been demonstrated.

RELATION OF COLLOIDS TO CLAYPANS

A major interest is maintained in a fundamental study of the chemical character of the colloidal material of soils. The importance of soil colloids as influencing soil fertility and soil behavior have previously been emphasized. New chemical and physical data have been obtained, all of which broaden the usefulness of such knowledge in soil classification and in the interpretation of soil problems.

A study of midwestern claypan soils by this division showed that such formations depend on the rainfall and the character of the parent material from which the soil is formed. The results show that in most cases claypans are formed by colloidal material which has been dispersed near the surface, translocated downward without change in chemical composition, and precipitated in a layer which is more alkaline than the soil at the surface.

EFFECT OF EROSION ON COLLOIDAL MATERIAL

Further studies in connection with soil erosion show that the total quantity of material eroded is not the sole index of the damage done to the fertility of the soil. When the quantity of erosion is small there is a relatively larger

quantity of colloidal material and organic matter in the run-off and wash-off than when the erosion is rapid.

STUDIES OF INFERTILE SOILS

In some agricultural areas there are soils greatly inferior to other soils in the immediate neighborhood. In certain cases the reason is not apparent from such factors as texture, drainage, moisture, etc. A study was made of some of these infertile soils, most of which are derived from basic rocks of high magnesian content. Comparisons of the chemical compositions of the soils, their colloids, and the parent rock show that these soils are unusual in showing a profound influence of the composition of the parent rock on the compositions of soil and colloid. Significant quantities of chromium and nickel are found to be present. The evidence indicates that these elements are definitely toxic to plant growth and in certain cases are the major cause of infertility.

MOISTURE RELATIONS OF SOILS

Studies of moisture relations in soils have been carried out with centrifugal forces as high as 300,000 gravity. This force serves to remove moisture to a point much below that available to a plant. Irrigationists, among others, are interested in laboratory methods for determining the field capacity of soils for water. Studies of the moisture distribution in carefully prepared soil columns indicate that the moisture content of wet soil in contact with a dry soil layer will give a satisfactory measure of the field capacity of soils of all textures.

Other lines of investigation being pursued in this division include studies of the constitution of peat, of the acidity of base-free soil acids, and of the rate and character of the hydrolytic effects on parent materials of soils. In addition to the research work, a very large amount of work on the routine examination of soils is being carried on, which includes mechanical and chemical analyses and the determination of physical qualities.

SOIL-MICROBIOLOGY INVESTIGATIONS

INSPECTION OF LEGUME INOCULANTS

The annual inspection of soil and seed inoculants centers upon two seasons—the fall planting of legumes and those planted in the spring. More than 600 samples have been collected and examined during the year, representing 31 producing establishments. Field tests of inoculants, under the control of the Division of Soil Microbiology, were conducted in Montgomery County, Md. Factory inspections included the plants which manufacture commercial inoculants in Ohio, Indiana, Illinois, Missouri, Iowa, Wisconsin, Michigan, New Jersey, New York, and Pennsylvania. Pressure for improvement in operations and personnel have apparently brought about fairly satisfactory service to the farmers since no complaints of extensive losses due to inoculation have been received during the year.

A SPECIAL INOCULANT FOR EVERY CROP

It was formerly believed that a small group of strains of legume organisms could be distributed and insure adequate inoculation for all legume crops. Recent experiments clearly indicate so close adaptation of particular strains of bacteria to particular species of legume, that best field results call for a special culture for each crop. Deterioration of such strains of bacteria in the laboratory and the field also appears, hence the maintenance of highest efficiency in legume growing calls for constant selection and improvement of legume inoculants.

CULTURES AVAILABLE

In response to the need of an available supply of such cultures, the Bureau maintains a collection of strains of nodule organisms representing all legume crops commonly raised in the United States, and many rare and special strains for legumes not commonly grown. The constant development of new legume-producing areas and introduction of new legumes to supply particular local needs, is paralleled by the accumulation of the Bureau's stock cultures of the necessary nodule bacteria. Cultures from this collection are widely distributed for experimental purposes.

MICROBIOLOGICAL TESTS FOR SOIL DEFICIENCIES

Studies of biological methods of determining fertilizer deficiencies in agricultural soils have continued in two lines—that of the *Azotobacter* or Winoogradsky plaque method and the Niklas or *Aspergillus niger* method. Aside from very limited success in one group of soils in the United States, the *azotobacter* plaque test must for the present be discarded. The *Aspergillus niger* test, under rigorous standardization, seems to be adaptable for use with all of the soils tried. The necessity of establishing a basal standard for each soil type, however, introduces a requirement of expense and research skill for each situation studied, which would necessarily limit its use to localities in which development of one-crop farming has been well organized over fairly extensive areas of particular soil types.

So many difficulties were encountered in the handling of the organisms involved in these tests that special study of one of them, *Azotobacter*, was undertaken.

STRAIN VARIATION IN AZOTOBACTER

A survey of the *Azotobacter* flora of soils collected from various parts of this country and from a few foreign countries has shown that the Ashby mannitol agar in classical use for this organism, is not satisfactory for demonstrating the presence of *Azotobacter*. In nearly all soils, a strain of *Azotobacter* was found by using starch or dextrin in the agar which was not able to utilize mannitol of the Ashby agar medium. In a few soils this was the only strain of *Azotobacter* found. Therefore, in searching for *Azotobacter* in soil, a nitrogen-free medium (Ashby base) with starch or dextrin instead of mannitol, must be used. There are instances in the literature where a fixation of nitrogen has been demonstrated but no *Azotobacter* has been found by the usual methods. The explanation may lie in the fact that the strain of *Azotobacter* in that particular soil could not use mannitol, the source of energy in the orthodox Ashby agar. Variations in the use of other carbon compounds by different strains of *Azotobacter* has also been observed.

SOIL FUNGI

Study of the groups of fungi from soils varying in type, in origin, and in crop production, have continued. Series of such cultures have been contributed for identification, by widely separated workers, thus furnishing opportunities for comparative studies of the fungous flora of different regions. The proof that certain species which are important as root rots of great destructive capacity, are also free-living members of the soil population, has given added importance to the establishment of sound information as to the normal balance between bacteria, molds, and other organisms necessary to crop growing. A preliminary survey of such a situation in the area of cotton root rot has furnished the basis for further studies in this field.

ARSENIC AND SELENIUM FUNGI

Numerous problems due to the presence of arsenic in soil have already been reported. Attention has also been given to the activity of molds in producing small quantities of other volatile toxic substances. Recognition of increasing residues of selenium fungicides reaching the soil, together with demonstration of the presence of selenium in large areas of native soil, give importance to the ability of soil organisms to decompose insoluble and nonvolatile selenium combinations with the release of offensive gases. Fungi have already been shown to volatilize arsenicals. These fungi and a still larger group of micro-organisms are found active in decomposing selenium compounds. Quantitative methods are being studied to test the possibilities and limits within which such micro-organisms may be found responsible for toxic conditions in crops grown, or, effective in freeing soil from accumulations of such elements in toxic amounts.

SOIL FUNGI AS ALLERGIC EXCITANTS

In cooperation with physicians studying asthma and related affections, the exciting cause of disease in particular individuals has been traced to fungi common in soil and decaying vegetation. Certain of these forms, such as *Alternaria*, *Cladosporium*, various species of *Aspergillus*, *Penicillium*, *Mucor*, and *Monilia*, have been implicated so often that many requests for cooperation

have been received. The recognition of other members of these same groups in human and animal diseases have occurred so frequently as largely to obliterate any line between the pathogenic and saprophytic fungi.

Such studies point to a need for better knowledge of the groups present in soil and their distribution in relation to soil type and soil management.

CELLULOSE DECOMPOSITION

The identification of common species of *Chaetomium* as rapid destroyers of cellulose has lead to further studies identifying several species of the genus and demonstrating their wide distribution. Mildewed cloth and deteriorating fiber materials of many kinds have been shown to carry the mycelium of *Chaetomium* which goes unrecognized in ordinary culture because other species overgrow and suppress it, whereas it finds optimum conditions in nature for destructive activity.

A method of using one species of *Chaetomium* to test the mildew resistance of textiles has been developed.

FERTILIZER INVESTIGATIONS

The Bureau is actively engaged in promoting our knowledge of methods of fertilizer production and improvement for the purpose of insuring to the farmer cheaper and more efficient fertilizers. This program involves the development of new processes, the improvement of old methods, the production, examination, and determination of the properties of new products, the investigation of raw materials suitable for conversion into fertilizers and the improvement of the physical form of fertilizers to facilitate their distribution in the field.

NITROGEN

CATALYSTS IN NITROGEN-FERTILIZER INVESTIGATIONS

The research work under this project is principally concerned with the study of the factors which influence and determine the activities of catalysts such as are used in the conversion of atmospheric nitrogen into nitrogenous fertilizer materials. The work being carried on at present centers upon a study of two types of catalysts involved, the water-gas catalysts used in the preparation and purification of hydrogen, and the synthetic-ammonia catalysts used in converting hydrogen-nitrogen mixtures into ammonia. The results obtained are of industrial and of scientific interest.

Investigation of the nature of the adsorption of hydrogen by iron synthetic-ammonia catalysts, work originally begun for the purpose of ascertaining whether a catalyst must be capable of activating molecular hydrogen in order to serve satisfactorily as an ammonia catalyst, has disclosed that the rate of conversion of ortho-hydrogen into para-hydrogen proceeds readily over an active synthetic-ammonia catalyst at temperatures as low as -189° C. and that, contrary to ideas heretofore current, this conversion is associated with physical rather than activated adsorption of hydrogen.

It was also discovered that the adsorption of hydrogen between temperatures -75° and 500° C. caused a marked poisoning of the catalyst for the conversion of ortho- to para-hydrogen at -189° . A study of this poisoning effect revealed definitely for the first time that there are at least three types of adsorption of hydrogen upon iron synthetic-ammonia catalysts, a physical adsorption at liquid-air temperatures, an activated adsorption at -78° to 0° C. and a second type of activated adsorption between 0° and 500° . These discoveries not only enlarge our knowledge of the nature of gas adsorption by solids, but assist in unraveling the mechanism by which hydrogen and nitrogen combine on the surface of iron catalysts to form ammonia.

Further study of the iron-nitrogen system has shown that the rate of nitrogen adsorption by the iron catalysts is apparently the slow step in the catalytic synthesis of ammonia, and that a good catalyst must be capable of bringing about a rapid activated adsorption of nitrogen upon its surface and of permitting this adsorbed nitrogen to react with hydrogen to form ammonia. This discovery is a decisive step toward solution of the question of why iron synthetic-ammonia catalysts differing so little in composition differ so markedly in their catalytic efficiency. Results which have been obtained during the year upon the rate of decomposition and rate of reduction of the various

nitrides of iron with hydrogen have also contributed toward a better understanding of the mechanism of ammonia synthesis and at the same time have yielded data which will be of use to those engaged in the commercial nitriding of steels.

PHYSICAL CONSTANTS OF GASES AND FERTILIZER SALTS

The solution of numerous problems confronting scientific investigators depends on a knowledge of the physical constants and the fundamental structure of the elementary substances and compounds involved. Recognizing this the Bureau is provided with efficiently supervised and well-equipped X-ray, crystallographic, spectroanalysis, photochemical, activation, and ionization laboratories which have made many contributions to scientific knowledge during the year.

The determination of the structure of the single molecules of the nitrogen oxides, nitrous oxide, nitrogen dioxide, nitrogen tetroxide, and nitrogen pentoxide, by means of electron refraction has definitely increased our knowledge of such molecules. The adsorption spectrum of nitrogen trioxide, discovered in the Fertilizer Investigation's laboratory, has been studied with respect to its behavior under various conditions of temperature and pressure. The photochemical dissociation of the molecule of nitrous oxide has been determined. The spectrographic study of an oxide of nitrogen which exists in the presence of nitrogen pentoxide and ozone has resulted in the important discovery that oxygen does not exert an influence on the absorption of light by nitrogen dioxide, which is contrary to previous belief. Technic for the absolute determination of the absorption coefficients in the infrared have been developed during the past 2 years and applied to as wide a range of compounds containing the NH group as has been available.

A mass spectrograph has been perfected which is capable of measuring accurately the abundance of isotopes of the substances that can be emitted as positive ions from heated filaments. Application thereof to the measurement of the isotopes of lithium emitted from spodumene and from ammonia catalysts has shown for the first time that the ratio of the isotopes given off from various emitters is in agreement with their abundance as computed from the atomic weight and the packing effect.

A new method has been devised to determine the rate at which neutral alkali atoms are emitted from ammonia catalysts and it has been shown that the ratio of atoms to ions emitted increases with the surface. For low concentrations, where the fraction covered by alkali is less than 0.1, the alkali is emitted almost entirely as ions, but above this fraction the emission of atoms increases very rapidly. The presence of alumina retards the diffusion and decreases the solubility of alkali in iron and hence increases the temperature for equivalent emissions as well as increases the atom emissivity at higher temperatures.

The photoelectric effect has been used to study the condition of adsorbed gases on metal surfaces. The effect of ammonia, hydrogen, methane, and oxygen on various surfaces has been studied and it has been found that, in general, electropositive gases decrease the work function of a metal when selectively adsorbed, while electronegative gases increase the work function.

The entropies of nitrogen, hydrogen, and carbon monoxide have been determined. These are especially valuable for the calculation of heats of reaction involving these gases and are therefore of considerable economic importance. The solubilities of hydrogen in liquid ammonia at 25°, 50°, and 75° up to 1,000 atmospheres pressure have also been determined.

The quantitative formulation of the relations between the pressure, volume, and temperature of compressed gases that has been carried out in previous years has led to the pursuit of methods of curve fitting and to the development of statistical tests for the goodness of fit of empirical formulas and for the detection of constant errors. This statistical work is being applied not only to the fertilizer problems under immediate investigation, but also to the interpretation and planning of experimental work on the yields of crops or the behavior of organisms under various treatments.

The nature of the compounds present in superphosphate has been determined by X-ray diffraction methods combined with chemical analysis. Fundamental work has been done on cholesteryl salicylate, a typical sterol compound related to vitamin D.

Evidence of the extremely valuable character of the physical research facilities at the Bureau's disposal has been demonstrated by the growing

demand for cooperative work between this unit and other units of the Bureau, as well as with other bureaus of the Department of Agriculture and with other departments. As instances of such cooperative work there may be cited the identification of plant waxes and acids for the Chemical and Technological Unit, the treatment of corn, tobacco, chestnuts, and beans by X-rays, in cooperation with the Bureau of Plant Industry, the photographing of the atmospheric absorption bands of ozone, in cooperation with the Smithsonian Institution, and the determination of the infrared spectra of hydrocarbons as a sensitive means of their determination, in cooperation with the Bureau of Standards.

PEAT AS A NITROGEN CARRIER

The investigation of the treatment of organic materials with ammonia has been continued during the year with special attention being given to the study of the products obtained by the ammoniation of peat. A detailed examination has been made of the influence of varying conditions on the character of the product. The chemical investigation of the types of nitrogenous materials formed has yielded interesting results. After exhaustive extractions with such solvents as water, alcohol, ether, and 2-percent and 10-percent hydrochloric acid it was found that the insoluble residue represented 58 percent of the original material and contained 47 percent of the original nitrogen. The major portion of the extractable material was found in the water extract, which contained 36 percent of the total nitrogen, 43 percent of which was in the form of urea and 7 percent as combined nitrogen. An analysis of the various extracts for humin, amide, basic, nonbasic, and amino nitrogen has been practically completed.

As an orientating research dextrose, starch, cellulose, and lignin have also been ammoniated and the products studied in order to obtain information concerning the constituents in peat that respond to ammoniation. It was found that cellulose is scarcely affected by ammonia, that starch, when ammoniated, yields a product containing 5 percent of nitrogen, whereas dextrose and lignin are extensively ammoniated. The solid matter obtained in the ammoniation of dextrose was 75 percent of the original weight and contained 16 percent of nitrogen, 46 percent of which was extractable with water. This fraction contained at least 7 percent of urea, as well as ammonium bicarbonate and substituted pyrazine bases. The residue obtained after exhaustive extraction with solvents represented 37 percent of the original solid material and contained 16 percent of nitrogen. In its physical properties it resembled closely the analogous residue from ammoniated peat.

In a number of vegetative pot tests with ammoniated peat the results from those on soils that were responsive to nitrogen gave an average response of 51 percent increase as compared with 100 for sodium nitrate. In pot tests employing the separated water-soluble nitrogen and the water-insoluble nitrogen good results were obtained with the water-soluble nitrogen but widely varying results with the water-insoluble nitrogen.

A series of tests, in which the rates of nitrification of ammoniated peat, the water-soluble and water-insoluble fractions therefrom, ammonium sulphate, cottonseed meal, and dried blood were compared, indicated that the ammoniated peat attains a 35-percent nitrification in an 8-week period as compared with ammonium sulphate and that this value is reached slowly, while the ammonium sulphate nitrifies much more rapidly. The water-soluble nitrogen nitrifies to the same degree as the ammonium sulphate and at almost the same rate, whereas nitrification of the insoluble nitrogen is quite slow, reaching a value of 17 percent only in 6 weeks.

During the year a new product has been produced by treatment of peat with carbon dioxide and ammonia by the same general technic as that used in the manufacture of ammoniated peat. The material thus obtained contains a high percentage of urea mixed with the ammoniated peat. A method is thus presented of producing a urea product which is free from the objectional physical properties of pure urea.

BIOCHEMICAL AND ORGANIC NITROGEN INVESTIGATIONS

Studies with *Azotobacter* during the past year have shown that either molybdenum or vanadium is essential in the process of nitrogen fixation by this organism. Although the bacteria will grow in a medium containing fixed

nitrogen without these elements, they are unable to use free nitrogen gas under these conditions. It is of particular interest that only about 10 to 50 parts per trillion of these elements are required, this being of the order of one-thousandth of the usual concentration involved in those cases where traces of elements are considered as needed for the nutrition of higher green plants. Natural soil humates may provide molybdenum and vanadium, as well as iron, to *Azotobacter* growing in a medium deficient in these elements, and it has been found that the rate of nitrogen fixation may be increased twofold to fourfold by such additions. These discoveries have greatly facilitated the study of the process of nitrogen fixation.

Further study of the mineral nutrition of mature cultures of *Azotobacter*, growing in both free and fixed nitrogen, with regard to magnesium, calcium, iron, sulphur, and phosphorus, have confirmed previous views concerning the specific nature of calcium in fixation as distinguished from growth and the nonspecificity of the other elements.

The carbohydrate metabolism of *Azotobacter* has been investigated under carefully controlled conditions and the ability to oxidize a large number of compounds determined. Several enzymes were discovered, including typical dehydrogenases and a carboxylase. The effects of poisons such as cyanide, sulphide, alcohol, and urethanes were determined, and the intermediate compounds formed during oxidation were ascertained.

On the basis of findings concerning the mechanism of fixation, graphical and analytical methods for determining enzyme dissociation constants and other properties of fundamental interest have been developed and the fact that *Azotobacter* cannot fix nitrogen below pH 6, although growth will occur in acid media if combined nitrogen is supplied, has been interpreted in terms of the Gibbs phase rule.

The previously reported discovery that certain species of legume nodule bacteria require an accessory growth factor has been confirmed by further investigations. This factor has been found to be widely distributed in plant and animal products and may be prepared in fairly concentrated form by extracting commercial sucrose, molasses, yeast, and many other materials with absolute alcohol. Only about 2 to 5 parts per million of dry matter, added to culture solutions, is required to give a good growth of nodule bacteria. Although *Azotobacter* synthesizes the factor it does not respond to additions of it.

In studies on the nitrogen "hunger condition" of nodulated legumes, which often occurs in young plants, it has been found that high light intensity tends to aggravate the condition and that the supplying of small amounts of combined nitrogen will not always correct it.

In the preparation and study of organic compounds suitable for high-pressure tests with nitrogen for the synthesis of organic nitrogen fertilizers, organic substances have been sought which are highly active but still sufficiently stable to manipulate under ordinary conditions since most promising results are to be expected from them. A group of unsaturated fluorene hydrocarbons has been found to fulfill these requirements. They react with ease with ammonia and amines to form nitrogen bases. This is the first instance in which such a reaction has been found to occur with hydrocarbons. Moreover, it has been shown that their property of removing hydrogen from certain organic materials not only holds for amines in liquid ammonia but also for alcohols, as well as amines, in alkaline media.

POTASH

During the year the development of the American potash industry, inception of which was fostered by the Bureau's researches, advanced to a peak production of 351,250 tons of potash salts, equivalent to 148,150 tons of potash. This is an increase of 245 percent in gross weight and of 238 percent in potash equivalent as compared with the preceding year. Sales were valued at \$5,226,000, a measure of the current value of the results of the efforts made to render the American farmer independent of foreign sources of this fertilizer essential.

The preservation of this domestic industry in a rational state of prosperity is essential if present gains are to be maintained. Accordingly, potash researches are directed toward both improved technology of manufacture and enlarged and more diversified utilization. The greatest handicap now borne

by the domestic industry being high distribution costs, study is being devoted both to the production of concentrated products and the development of new industries to provide potash for the more isolated regions.

A simple method for the production of potassium metaphosphate from potassium chloride and phosphoric acid has been developed. Data of a fundamental nature regarding the reactions involved and the properties of the finished product have been obtained which show the procedure to be not only feasible but the product itself to possess unusual and eminently desirable physical and chemical properties.

A new process for the economical production of potassium sulphate (of which the United States, during the past 10 years has imported \$3,000,000 worth annually) has been developed. In this and the afore-mentioned metaphosphate production hydrochloric acid is yielded, the application of which to the rendering of phosphates by a new process to yield a new, low-cost product has been investigated.

The application of hydrochloric acid to the extraction of potash and alumina from silicates, such as Georgia shale, has been studied. The resulting chlorides are fractionally hydrolyzed to yield potassium chloride and a marketable grade of alumina.

The problem of the utilization of the enormous potash resources represented by Wyoming leucite has been brought a step nearer a solution by completion of a small-scale plant capable of producing high-grade alumina and potassium nitrate. It has been established that nitric acid treatment of Wyomingite therein results in the production of alumina of substantially 100-percent purity and potassium nitrate of 99-percent purity. Both these materials have well established markets, the alumina entering into the manufacture of ceramics and aluminum and the potassium nitrate into the fertilizer trade.

Work on the solubility of Utah alunite has been rounded out by determining the solubility of the roasted material in various solvents. A final summation of the results shows that of all the solvents studied sodium hydroxide was the most effective, 93.44 percent of the potash and 91.17 percent of the alumina being soluble therein at 600° C.

In the production of potassium sulphate from Texas and New Mexico polyhalite by the ammonium-carbonate process developed in this Bureau, it has been found that the yield of the sulphate can be greatly increased by treating the resulting ammonium-potassium sulphate product with potassium chloride, with enhanced economy. The resulting ammonium chloride is employed as a source of ammonia to be recycled. This process provides an increased output and diversification by the existing potash industry of New Mexico.

PHOSPHATES

A continuation of the work on the preparation of phosphate fertilizer by the calcination of silica-bearing phosphate rock at about 1,400° C. in the presence of water vapor has shown that the process is applicable to most types and grades of phosphate rock produced in the United States. As compared with the manufacture of ordinary superphosphate, which is the principal phosphate fertilizer in this country, the new process has the advantages that (1) the reagents, silica, water, and fuel (powdered coal or fuel oil), are the most widely distributed and cheapest of all reagents, (2) the final product is free from diluents other than those naturally occurring in the rock (since the usual commercial grades of phosphate rock contain sufficient silica for the reaction) and contains 30 to 35 percent of phosphoric acid as compared with 16 to 20 percent in ordinary superphosphate, (3) the higher phosphoric acid content of the product makes possible the production of higher grade fertilizer mixtures with consequent reduction of transportation and handling costs per unit of plant food, (4) the product contains no free acid or acid salts, is neutral or slightly alkaline in reaction and has no deleterious action on bags and other containers and on fertilizer machinery, (5) the product not only has excellent mechanical properties but improves the mechanical properties of mixtures in which it is contained, (6) unlike superphosphate, the product contains relatively little fluorine and it may therefore be used as a substitute for bone meal in mineral supplements for livestock feeding, and (7) approximately 75 percent of the fluorine in the phosphate rock may be recovered as a byproduct of the new process in comparison with a 20-percent recovery in the manufacture of superphosphate, thus insuring an adequate supply of fluorine compounds for use as insecticides and agricultural poisons. The results of experiments con-

ducted during the past year indicate that the fertilizer value of the phosphoric acid in calcined phosphate is equal to that of an equivalent amount of phosphoric acid in the form of superphosphate.

Further studies made on the treatment of phosphate rock with phosphoric acid have shown that it is possible to produce nonsegregating, complete fertilizers in a single operation by the direct action of phosphoric acid or of phosphoric and sulphuric acids on mixtures of phosphate rock and potash and nitrogen salts. A further improvement in the process comprises the treatment of mixtures of phosphate rock and potash salts with phosphoric acid or mixtures of phosphoric and sulphuric acids, with subsequent direct addition of up to about 10 percent of anhydrous ammonia to the wet mixture, the heat generated eliminating the artificial drying that would otherwise be necessary.

In connection with work done during the year on the composition, chemistry, and properties of ordinary and double or triple superphosphates, an accurate method has been developed for the determination of water in its various states of combination in the commercial materials and in their pure components. Studies were also made on the occurrence and distribution of fluorine compounds and free acids in superphosphates.

As a result of the Bureau's investigations of the production of phosphate fertilizers by the blast-furnace process, carried on during 1928-33, and involving the construction and operation of a number of experimental blast-furnace units, the fundamental principles of phosphate smelting have been determined rather accurately with reference to such factors as blast temperatures, moisture in the blast, character of the phosphate rock and fuel, size and general design of the furnace unit, and methods of charging and blowing the furnaces. The Tennessee Valley Authority became interested in the Bureau's experimental findings early in the last fiscal year, and in the economic possibilities of blast-furnace methods for the production of low-cost fertilizer materials. Being desirous of carrying forward as vigorously as possible further experimental determination of certain engineering details and factors of design, the Authority entered into a cooperative agreement with the Department of Agriculture through this Bureau whereby the blast furnace and all its accessories, together with the Bureau's blast-furnace personnel, were made available to the Authority from October 10, 1933, to June 30, 1934.

MIXED-FERTILIZER TECHNOLOGY

An investigation of the fertilizers that have been consumed in the United States since 1880 has disclosed that, whereas the fertilizers used in 1880 had a basicity equivalent to 41 pounds of calcium carbonate per ton, those used in 1932 would require 148 pounds of calcium carbonate per ton to neutralize their acid-forming ingredients. The use of fertilizers of such high acidity has been shown to impair the crop-producing capacity of many soils to which they are applied. In a study of the reactions that take place in fertilizer mixtures to which a sufficient quantity of limestone or dolomite has been added to give a physiologically neutral mixture, it has been found that the addition of limestone to monoammonium phosphate must be limited to 1 mol calcium carbonate per mol of phosphoric acid if loss of ammonia and formation of citrate-insoluble phosphoric acid is to be prevented. Although monoammonium phosphate also reacts with dolomite in the presence of moisture to evolve carbon dioxide, no loss of ammonia or increase in citrate-insoluble phosphoric acid occurs regardless of the proportions of these materials, at ordinary temperatures. The use of dolomite has the further advantage of causing the fixation of part of the ammonia in the mixture in the form of the slightly soluble, but available, compound, magnesium ammonium phosphate. This compound has the advantages of being nonhygroscopic, not burning crops, acting as a conditioner in fertilizer mixtures, and serving as a source of available magnesium. A simple method has been developed for its preparation from monoammonium phosphate and calcined dolomite.

Continuation of work on the ammoniation of double superphosphate has disclosed that the heat developed when double superphosphate is treated with 8 to 10 percent of ammonia is sufficient to bring about an automatic granulation of the product in the usual type of rotary apparatus used, and that the size of the granules produced varies with the original moisture content of the double superphosphate. Heat is also developed in the ammoniation of concentrated mixtures containing double superphosphates but this has to be supplemented by some external heat for a satisfactory granulation of the mixture.

It has been found that dicalcium phosphate will not undergo ammoniation at ordinary temperatures but that at temperatures above 60° C. ammonia is absorbed to form tricalcium phosphate and diammonium phosphate. It follows, therefore, that a double superphosphate which has been ammoniated below 60° will not contain any citrate-insoluble phosphoric acid irrespective of the quantity of ammonia added. More or less citrate-insoluble phosphoric acid will form, however, if the ammonia added exceeds 10.5 percent when the heat of reaction is permitted to raise the temperature of the mass above 60° C.

An analytical method has been developed for the determination of the free acid in superphosphates and, on the recommendation of the Association of Official Agricultural Chemists, a collaborative study of this and other proposed methods is now being made under the auspices of this Bureau with a view to the official adoption of that method found to be most satisfactory.

In a study of the chemical and physical properties of urea-phosphate mixtures it was found that mixtures made from 1 mol or less of urea per mol of monocalcium phosphate are not hygroscopic, whereas those formed with more than this proportion of urea are very hygroscopic. This has been shown to be due to the fact that mixtures of urea and urea phosphate are very hygroscopic whereas mixtures of urea with dicalcium phosphate and of urea phosphate with dicalcium phosphate or monocalcium phosphate are not hygroscopic. When mixtures are made of 1 mol or less of urea per mol of monocalcium phosphate the final mixture contains no excess urea in admixture with the urea phosphate formed by the interaction of the urea and monocalcium phosphate. It has also been shown that the water of crystallization liberated from the monocalcium phosphate in this reaction does not combine with the dicalcium phosphate that is also formed, and that, at relative humidities below 70 percent, this water tends to be evolved from the mixture unless the proportion of urea initially present exceeds 50-mol percent. Dicalcium phosphate dihydrate mixed with urea has been found to lose its water of crystallization more rapidly than the dihydrate alone, and mixtures of the dihydrate with urea phosphate lose their water of crystallization rapidly and quite completely. Urea phosphate, on the other hand, has little effect on the water of crystallization of monocalcium phosphate. A method has been developed for determining monocalcium phosphate by means of its reaction with urea. This method will permit the direct determination of monocalcium phosphate in admixture with dicalcium phosphate or in superphosphates and double superphosphates whereas only indirect methods have been available previously.

A study of the effect of the heat liberated during the ammoniation of superphosphates upon urea present in the mixture or added during the ammoniation has shown that the urea is susceptible to decomposition, the extent of this decomposition being dependent on the amount of water present, the extent of the ammoniation, the hydrogen-ion concentration, and the temperature. It has been found that the urea may in some cases be completely decomposed without loss of nitrogen, the ammonia produced being absorbed by the acidic constituents of the mixture. No appreciable decomposition occurs when the temperature is kept below 55° C. The results obtained will serve as a guide for choosing proper conditions for the treatment of superphosphates with urea-ammonia mixtures and the ammoniation of superphosphate mixtures that contain urea.

In 1900, 91 percent of the nitrogen contained in mixed fertilizers was supplied by organic ammoniates. Since then the supply of such materials at prices that can compete in the fertilizer industry has steadily diminished until in 1931 only 19 percent of the nitrogen in mixed fertilizers was derived from this source. This is largely due to the conversion of such materials into feeding stuffs. At the same time the development of nitrogen fixation has resulted in an ample supply of new materials at lower prices. These new materials contain much higher percentages of plant food than those formerly used. The principal materials used to supply phosphoric acid and potash in mixed fertilizers have also increased in concentration due to changes in the source of supply of raw materials and improvements in processes of manufacture. It has therefore become necessary either to make fertilizers of higher analysis than formerly or to dilute with filler the high-grade materials now available in order to maintain the same low-analysis mixtures. In a study that has been made to determine the nature and the extent of the changes that have actually occurred it was found that the average mixed fertilizer in 1880 contained 2.3 percent of nitrogen, 8.9 percent of available phosphoric acid, and

2.2 percent of potash. In 1931 these plant-food contents had increased to 3.3 percent of nitrogen, 9.6 percent of available phosphoric acid, and 5 percent of potash. The percentage of filler used had increased from none at all in 1880 to 15.2 percent by weight in 1931. If no filler had been used in 1931 the average mixed fertilizer would have contained 21 percent of plant food instead of 18 percent. In some States very little change in concentration has taken place and much filler is used, whereas in others the reverse is true. Filler costs money itself and adds to the cost of bagging, mixing, freight, and other charges on the mixture containing it and, in general, adds nothing of value to the consumer. A part of it could be replaced with basic materials to neutralize physiological acidity with great advantage to the consumer in sections where soils are already acid, as they are throughout most of the section where the bulk of commercial fertilizers is used. To eliminate the balance of the filler will require education of the consumer so that he will cease to demand mixtures of low price per ton which nevertheless are relatively high in cost per pound of plant food.

INFORMATIONAL AND EDITORIAL SERVICE

During the past fiscal year the Bureau has issued 46 official printed publications, which include 33 soil-survey reports, 6 technical bulletins, 5 circulars, and 2 miscellaneous publications. In addition to these publications, 10 articles from the Bureau appeared in the 1934 Yearbook of Agriculture.

More than 170 articles on various phases of the Bureau's work have been published in outside journals and periodicals in addition to timely information which the Bureau has furnished to newspapers through cooperation with the Press Service of the Department.

Following is a detailed list of the Bureau's official publications printed during the last fiscal year:

PUBLICATIONS OF THE BUREAU OF CHEMISTRY AND SOILS ISSUED DURING THE YEAR JULY 1, 1933 TO JUNE 30, 1934

TECHNICAL BULLETINS

No. 371. The Effect of Different Colloidal Soil Materials on the Efficiency of Superphosphate.

No. 373. Studies of Fluorine Compounds for Controlling the Codling Moth. (Joint publication with Bureau of Entomology.)

No. 377. Character and Behavior of Organic Soil Colloids.

No. 383. Microbiological Studies of Salt in Relation to the Reddening of Salted Hides.

No. 389. The Decomposition of Hydrolytic Peat Products Including Ammoniated Peat.

No. 399. A Study of Claypan Soils.

CIRCULARS

No. 273. Effects of Time of Planting and of Fertilizer Mixtures on the Curly-

Top Resistant Sugar-Beet Variety U.S. No. 1 in Idaho. (Joint publication with Bureau of Plant Industry.)

No. 290. Grades of Peat and Muck for Soil Improvement.

No. 303. Soil Profile and Root Penetration as Indicators of Apple Production in the Lake Shore District of Western New York.

No. 304. Windrowing Qualities of Co. 281 and Other Varieties of Sugarcane under Louisiana Conditions. (Joint publication with Bureau of Plant Industry.)

No. 315. Changes in Composition of American Fertilizers, 1880-1932.

MISCELLANEOUS PUBLICATIONS

No. 176. Bibliography of Chloropicrin, 1848-1932.

No. 186. Reconnaissance Erosion Survey of the Brazos River Watershed, Texas.

SOIL SURVEYS

El Cajon area, Calif.
Crawford County, Iowa.
Eaton County, Mich.
Paso Robles area, Calif.
Hancock County, Iowa.
Hitchcock County, Nebr.
Erie County, N.Y.
Worth County, Ga.
Guthrie County, Iowa.
Delaware County, N.Y.
Midland County, Tex.
Nogales area, Ariz.
Blackford County, Ind.
Van Zandt County, Tex.
Yuma-Wellton area, Ariz.-Calif.
Capistrano area, Calif.
Macon County, N.C.

Brown County, Wis.
Reconnaissance of the Northern Plains of Montana.
Colfax County, Nebr.
Coosa County, Ala.
Harlan County, Nebr.
Craven County, N.C.
Montgomery County, N.C.
Lower Flathead Valley area, Montana.
Washington County, Iowa.
Greenwood County, S.C.
Suisun area, Calif.
Steuben County, N.Y.
Grayson County, Va.
Queen Annes County, Md.
Dundy County, Nebr.
Hardy and Pendleton Counties, W.Va.

YEARBOOK ARTICLES

Eggs Oiled by Vacuum Carbon Dioxide Method Keep Well in Storage.
Fertilizers May Add to Soil Acidity; Neutral Mixtures Desirable.
Fertilizer Studies Show Important Possibilities in Ammoniated Peat.
Fertilizers Without Filler Cost Less and Meet Ordinary Needs.
Magnesium Deficiency in Certain Soil Types Reduces Potato Yields.
Rancidity in Foods Delayed by Excluding Certain Wave Lengths of Light.
Soil Erosion Studies Show Vegetation Has Dominant Role.
Soil Survey is the Necessary Basis of Land Classification.
Soybean's Content of Amino Acids Varies Greatly With Variety.
Vitamin Standards of International Conference Being Adopted in the United States

REPORT OF THE CHIEF OF THE BUREAU OF DAIRY INDUSTRY, 1934

UNITED STATES DEPARTMENT OF AGRICULTURE,
BUREAU OF DAIRY INDUSTRY,
WASHINGTON, D.C., *September 1, 1934.*

SIR: I submit herewith a report of the work of the Bureau of Dairy Industry for the fiscal year ended June 30, 1934.

Respectfully,

O. E. REED, *Chief.*

HON. HENRY A. WALLACE,
Secretary of Agriculture.

Any program directed toward the economic adjustment and stabilization of the dairy industry would be facilitated by an expansion of the dairy herd-improvement association work throughout the country. Membership in such associations would provide dairy farmers with records of production, income, and feed costs, as well as other information, which would enable them to adjust their operations to changing conditions more intelligently than can be done without records. Records on a larger proportion of our dairy herds would also provide information for formulating a fair Government program of production control or economic adjustment, and for making a permanent and more rapid improvement in dairy-cow efficiency through breeding.

Many farmers are milking cows that do not produce enough milk or butterfat to make a profit, even at much higher prices for dairy products. The 24,489,000 cows milked in the United States last year produced an average of 164 pounds of butterfat and 4,178 pounds of milk. Obviously many cows produced much less than the average quantities; many thousands were probably kept and fed a whole year for a return of but 1,000 or 2,000 pounds of milk. Such cows cannot under any circumstances be considered efficient milk producers. Inefficient, low-producing cows not only waste the farmer's time and feed but increase the total quantity of milk on the market, which tends to depress the price of all milk when there is a surplus.

On the other hand, the cows on test in 716 associations in 44 States last year produced an average of 313 pounds of butterfat and 7,849 pounds of milk. The association cows ate an average of \$52 worth of feed and returned \$131 for their product, or \$2.52 for every dollar spent for feed. When a cow returns more than \$2 for a dollar's worth of feed, she is paying well for her feed, for labor and overhead, and making a profit for her owner in addition. The comparatively high average production and profitability of the association herds is due largely to culling low producers from the herds, assembling and breeding more efficient producers to take their place, and feeding more economically.

Expanding herd-improvement association work would tend to develop a national dairy herd as profitable as some of our association herds. Testing and keeping records in such associations would stimulate the culling of unprofitable cows, and such culling would make some immediate improvement in the dairy herds of the country. Permanent improvement, however, can come only through eliminating the "breeding inheritance" which is responsible for filling the dairyman's barn with potentially unprofitable milk producers year after year.

It is estimated that at least one-third of the heifers raised for replacement purposes are predestined by inheritance to be unprofitable cows. Raising these heifers to the age when the owner can test them and determine which to cull from the herd is costly to the dairy farmer, as well as to the entire dairy

industry. To eliminate this waste of time and money, we need to develop herd sires that are pure enough in their genetic make-up to sire a larger proportion of daughters in the profitable-producing class. Testing all the daughters of a sire and comparing their production performance with that of their dams is the only way we can locate outstanding sires, or gain sufficient breeding information to develop such sires.

There are today only about 325,000 cows on test, in about 14,000 herds. This is a pitifully small number of cows and herds with which to work for improvement through breeding.

It would not be necessary, nor perhaps desirable, to expand herd-improvement work to include all cows being milked. Progress through breeding could be made by working with the larger herds where the owners have the facilities and the incentive to apply essential breeding knowledge and practice. According to the best available figures there are approximately 1,380,000 herds of 6 cows or more, containing a total of about 15,850,000 dairy cows. If testing were done on a bimonthly basis, it would be feasible and practicable to organize 5,000 regular dairy herd-improvement associations of 50 dairymen each, with 600 cows in each association, or 3,000,000 cows in all. This would be about 20 percent of the cows in herds of six cows or more.

The principal reason more dairy farmers have not enrolled in such associations in the past has been the expense. Many foreign countries long ago recognized the importance of obtaining production records as a basis for improving the efficiency of their dairy cattle on a national scale, and a number of them now make special grants or appropriations to assist the farmers in testing their cows and keeping records.

The value of such an expansion of herd improvement would not be limited to the immediate benefits that would result from culling, nor to the future and permanent benefits that would result from breeding. The organization of these associations would afford a splendid opportunity to stress the advantages of the so-called "back to grass" program. Men assigned to the organization work would have a knowledge of approved feeding practices, or be accompanied by feeding specialists. Each tester also would have a knowledge of better feeding practices, of the value of devoting more of the farm to pasture and roughage crops; he would serve as a continuous medium through which such information could be carried to the dairy farmer. Each herd on test, and each association in a community, would serve as a local demonstration of the economic advantages of following approved dairy practices.

During the last year the Bureau's extension activities in furthering record-keeping work, economical feeding, better breeding, and improvement in the quality of dairy products, have been curtailed considerably by the fact that the 4 extension specialists were assigned to the Agricultural Adjustment Administration for about 8 months to work on milk-marketing agreements, licenses, and production-control plans.

Funds allotted by the national recovery agencies to provide work for unemployed laborers enabled the Bureau not only to furnish more than 225,000 man-hours of employment, from October 1933 to July 1934, but to advance construction and repair work at the various field stations several years ahead of the contemplated schedule.

Land clearing, drainage and fencing, road construction and improvement, and general repair of station equipment was carried on with Civil Works Administration funds. With Public Works funds construction of several new buildings was started, and others already being built were completed during the year. The principal new structure on which work was started is a laboratory and dairy-products building at the Beltsville station. This building, which is now about half completed, will be equipped for the experimental manufacture of dairy products and dairy byproducts on a semifactory scale. It will fill a long-felt need for a place in which to try out and adapt the results of laboratory research under factory-scale conditions.

The nutrition laboratory at Beltsville, on which construction was begun in 1931, was completed and equipped during the year. This building will provide modern and adequate laboratory facilities for investigational work in all phases of dairy-cattle nutrition. Other construction work started and brought to completion during the year includes an addition to the present nutrition barn, in which to house and care for experimental animals; a barn for storing additional feed and hay; an autopsy building; a quarantine barn; a young stock barn; and hay barracks. Work was brought to various stages of completion on the construction of a calf barn, a test barn, and a calf and maternity barn to facilitate the care of cows and calves at calving time.

Nineteen acres of land acquired during the year makes a total of 550 acres now available for dairy work at the Beltsville station.

Progress in the research work in the Bureau's laboratories and at its various field experiment stations is summarized in the following pages.

DIVISION OF DAIRY RESEARCH LABORATORIES

L. A. ROGERS, in charge

NUTRITION OF DAIRY COWS

Results previously reported have demonstrated that when cows that are giving liberal quantities of milk are fed for several years without pasture they get little more than sufficient vitamin A to support normal reproduction when their roughage consists entirely of no. 1 alfalfa hay. Substituting roughages with lower vitamin A contents for part of the no. 1 alfalfa is likely to result sooner or later in the cows' throwing a certain proportion of their calves prematurely, or dead, or weak. It is evident that many premature births are caused by vitamin A deficiency and that this condition can be corrected in a large measure by proper attention to the quality of the roughage. In seasons of exceptionally dry pastures this condition is likely to be aggravated, and may call for supplemental feeding with cod-liver oil, carrots, or other feeds rich in vitamin A.

The deficiency in the poor roughages is reflected in the milk produced, which is so lacking in vitamin A that calves depending on it for this vitamin invariably suffer with the symptoms of vitamin A deficiency. The evidence obtained with alfalfa and timothy hays points to a lack of vitamin A in the ration, but corn silage which has a carotene content equivalent to that of good alfalfa hay does not take the place of pasture in providing the milking cow with accessory substances.

The results so far obtained indicate that the deficiency in corn silage is of a different nature than that in poor timothy hay. These results have raised the question of the extent to which cows on pasture can store vitamins to carry them over a winter period of feeding on low-quality roughages. Preliminary results indicate that nonmilking cows may do this successfully, but that alfalfa hay of the best quality furnishes barely enough vitamin A for immediate needs and that a change to poor timothy hay would result in defective reproduction.

These results emphasize still further the importance of vitamin A in the ration of dairy calves under practical conditions, and suggest that the chief reason why it has been advantageous to feed calves on whole milk up to the age of about a month is connected with their vitamin A requirements. Up to the age of about a month, calves consume very little food other than milk and cannot, therefore, obtain vitamin A from roughages which become the normal source of supply from 1 month of age on. During the first month, therefore, they must get vitamin A from whole milk unless it is supplied in some unusual form such as pure carotene or cod-liver oil. Calves cannot obtain sufficient vitamin A from whole milk produced by cows on poor hay, but calves fed on whole milk of this kind for 30 days and then on skim milk from the same source and supplied with good alfalfa hay make normal gains in weight, provided that they begin eating the hay in fair quantities at about the time that they are changed from whole to skim milk.

The determination of the vitamin A content of feeds is now a matter of considerable importance and a method which will obviate the time-consuming method of assaying the vitamin value by animal feeding is very desirable. The close relation between the carotene of green feeds and the vitamin A value has been generally recognized, but there has been no assurance that all of the vitamin A could be accounted for by determining the carotene. Results obtained in the past year show in a most satisfactory way that all of the carotene of alfalfa hay is beta-carotene and that the vitamin A activity of the hay is fully accounted for by its beta-carotene content. Consequently, by determining the beta-carotene content, it is now possible to determine the vitamin A value of various roughages. This carotene content ranges from 9 or 10 gamma per gram of dry matter for timothy hay to from 35 to 100 for good alfalfa hay, or to about 1,000 for carrots.

Although rats are not hay-eating animals, it has been found possible to utilize them to some extent in determining the vitamin values of hays. Rats on a ration furnishing all of the known accessory substances except vitamin B₂ have developed symptoms suggestive of pellagra, one of the most prominent features being loss of hair. This condition is cured by the addition to the

ration of small amounts of either alfalfa or timothy hay of good quality. It seems possible that rats may be used to test the vitamin B₂ content of different kinds of hay.

Rabbits have been used successfully in certain kinds of feeding experiments on account of their ability to utilize roughages, but in recent work they have shown idiosyncrasies which must be better understood before they can be used for general vitamin work. It has been demonstrated that they cannot obtain vitamin A from cod-liver oil, and their reactions with some of the salt mixtures commonly used in experimental work do not coincide with those of other laboratory animals.

The effect of varying the protein level in the ration of high-producing cows is being investigated, and 1 cow has completed 2 lactation periods, 1 on high protein and the other on low protein. The results so far obtained indicate that protein is stored in the body in periods of abundant protein supply, and when, in a period of protein deficiency, this reserve is exhausted the milk yield drops suddenly. It was also observed that the fat content of the milk is distinctly lower in periods in which a low-protein ration is fed.

BACTERIOLOGY AND CHEMISTRY OF MILK

Because of the importance of bacterial spores in the sterilization of all food products, including evaporated milk, the studies on their germination and destruction by heat have been continued, although no results of great practical value have been obtained. However, the mass of data being accumulated, relative to the conditions which determine the heat resistance and germination of these spores, is likely to lead to significant results.

In general this work has shown that natural conditions of habitat are particularly conducive to thermal resistance in spores, while the prolonged action of growth products upon spores tends to materially reduce their thermal resistance. Moderate and high temperatures of incubation are conducive to a greater proportion of heat-resistant spores and usually extends the survival time. Aging of spores up to 9 months increases the proportion of resistant cells and the thermal death time of several species. Desiccation usually increases the thermal resistance, although some variation in response to this factor was observed.

This work furnishes at least a partial explanation for the enhanced heat resistance of bacterial spores which gain access to food products prior to canning and frequently cause heavy spoilage losses.

In connection with radiation studies upon bacterial spores, the following observations have been made. In a suspension of spores the heat-sensitive spores are not necessarily identical with radiation-sensitive spores. Thus, while the majority of spores in a given suspension are susceptible to both heat and radiation, some are susceptible to heat and not to radiation, and *visa versa*. Certain spores, therefore, may be resistant to heat and still be sensitive to ultraviolet radiation. This fact is not in accord with the commonly accepted idea that all cell masses contain variable numbers of so-called "weak" individuals which are uniformly susceptible to all adverse influences.

Attempts to induce spores to go into the vegetative stage and thus become sensitive to heat have not been successful, although it was found that extracts of various materials including mold mycelium, potatoes, and beef liver had a marked stimulating effect on the germination of some spores especially when this was combined with a preliminary heat treatment. Unfortunately, this did not hold for the more resistant spores and so far has been of no practical value.

In all dairy-manufacturing processes and particularly in making cheese and evaporated milk, difficulties, sometimes resulting in serious defects, are encountered which may be traced to the condition of the milk. This is due to bacterial action, pathological conditions in the cow, and possibly in some cases to deficiencies in the feed. The detection of these conditions before the manufacturing is started is of the greatest importance and is necessary to the correction of the defects.

The reductase or methylene blue test has proved to be very useful as an indication of the bacteriological condition of the milk. It has been found that additional information in regard to the nature of the bacteria in the milk can be obtained by adding a small amount of peptone to the milk. This accelerates the growth of certain types of bacteria and decreases the time of reduction.

The reduction time of another indicator has been shown to vary greatly with different types of milk, but the significance of these variations has not been fully determined. Other tests of a chemical nature are being developed to

indicate, and if possible measure, the differences in milks and the changes which take place when milk is held at temperatures which preclude the action of bacteria.

The peculiar reaction which results when a bacterial preparation for direct microscopic count is treated with the filtrate of a lactic culture has proved very useful in the study of pure-culture starters for Swiss-cheese making. This method makes it possible to differentiate living from dead bacteria by staining. The accuracy of the count on growing cultures is demonstrated by the fact that the logarithms of the microscopic counts of living cells fall on a straight line.

The probable importance of phospholipids in determining the difference in the physical properties of milks as well as their probable importance as intermediates in the process of milk-fat synthesis seemed to justify their thorough investigation. Their amounts in different milk products have been determined and the distribution among the various products calculated. It was further determined that in those products wherein the phospholipid concentration is relatively the greatest these compounds introduce errors into the fat tests commonly used. These errors, due to the phospholipids, account to a large extent for the difficulties experienced in attempting to evaluate the relative accuracy of the fat tests.

To obtain a correct factor for their determination through the phosphorus content, phospholipids isolated from milk have been analyzed for their molecular constituents. Thus far no acid of lower molecular weight than myristic has been found. Furthermore, palmitic, which is found in abundance in milk fat, is absent in the phospholipids. The significance of this fact with respect to the theory of fat synthesis through the phospholipids is not evident. With the isolated phospholipid, solubility studies have shown that the methods of isolation probably do not account for all of these compounds present. This study is being continued.

It has been appreciated for some time that various methods devised here and elsewhere for the detection of the susceptibility of fats to oxidation cannot be applied to all fats with assurance of accurate results in all cases. Because of differences in their unsaturated acid constituents, fats differ in the reactions which occur as oxidation proceeds. Thus, when the peroxide value is used as a criterion of the rate of oxidation the temperature at which lard or cottonseed oil may be held without peroxide destruction is lower than that which may be used for butter oil. The greater the ease of oxidation of an oil the lower must be the temperature at which the oil is held when using the peroxide test as a measure of susceptibility. In a study of anti-oxidants to determine what types are effective in retarding oxidation, it has been found that maleic acid and chemically related compounds act in this capacity. A study of these compounds and their derivatives, as well as various oxidation-reduction systems, has added materially to our knowledge of the mechanism involved in the oxidation reactions causing spoilage of dairy products.

Casein, on account of its complex chemical structure and peculiar physical properties, offers many opportunities for converting into products of value in the arts. In the past year work preliminary to an exhaustive study of this problem has been carried on. One of the first requisites is a supply of uniformly pure casein. It has been found that the grain-curd method developed by these laboratories for commercial manufacture can, with some minor refinements, be used to produce a casein as free from impurities as that made by the Hammersten process and generally accepted as the standard for laboratory purposes. A second essential for the investigation of this problem is a satisfactory solvent. A solvent which will dissolve a large proportion of casein has already been found. In the fractionation of casein a large amount of work on analytical methods has been necessary, but this has been completed and some progress made in separating casein into fractions for further investigation.

CHEESE

A sufficient number of wheels of Swiss cheese have been made under controlled commercial conditions at the Grove City Creamery, Grove City, Pa., to permit a statistical study of the relation of the progressive change in the hydrogen-ion concentration of the curd to the quality of the cheese.

It has already been demonstrated that a decrease in the pH value of the curd in the first 3 hours in the press gives an indication of the activity of the thermophilic streptococci while the pH value at 21 hours may be used as a

measure of the growth of the lactobacilli after the temperature becomes favorable to these organisms. The data collected at Grove City show that of the cheeses in which the pH value reached 5.20 to 5.00 in 21 hours, a large proportion were of satisfactory quality while an equally large proportion of those which did not reach this pH value were inferior in one way or another. However, it is evident that the mere increase of acidity to this pH value is not sufficient to insure good quality since some varieties of lactobacilli produce the required increase in acidity without making a satisfactory cheese.

These cheeses have also shown that to obtain the required bacterial development as indicated by the determination of the hydrogen-ion concentration, it is not sufficient that the right bacteria in the proper proportions and the correct stage of growth be introduced into the milk. Other factors which may be inherent in the milk or may be within the control of the cheesemaker influence the growth of the essential bacteria to such an extent that it is sometimes very difficult to secure the necessary bacterial growth in the cheese. Recent work has shown the exacting requirements which must be met to insure the proper development of the bacterial starters. The temperature must be controlled within a fraction of a degree and a caramelization of the milk through too severe sterilization will so affect the growth of the culture that it will not be in condition to multiply properly in the cheese.

All these results demonstrate quite conclusively that it is not possible to prepare any formula or recipe for the manufacture of Swiss cheese. Even with a skilled cheesemaker some degree of laboratory supervision is required. It is not enough merely to have a technician trained to transfer cultures and determine hydrogen-ion concentration. To be successful in controlling the complicated biological process involved in the manufacture of Swiss cheese one must have a thorough understanding of the physiology of the bacteria with which he is working and be sufficiently skilled in the technical side of the manufacture to adjust the making process to the constantly varying conditions.

Results obtained in the first year's study of the manufacture of Swiss cheese from pasteurized milk do not warrant the recommendation of this system. In almost all cases the cheeses from pasteurized milk have been inferior to those made from raw milk. These results do not agree with those obtained elsewhere and it is possible that modifications in some of the manufacturing methods may produce different results. Somewhat similar results have been obtained in the study of the manufacture of Cheddar cheese from pasteurized milk. While the cheeses from pasteurized milk have been of good quality, they have invariably lacked something of the characteristic Cheddar flavor always observed in cheese made from raw milk. No significant differences in the bacterial flora of raw-milk and pasteurized-milk cheese have been detected but there has been uniformly a lower pH value in the pasteurized-milk cheese. The significance of this difference has not been determined.

Tests have been made of methods and materials for wrapping Swiss cheese when it is cut for distribution to the retail trade. It has been found possible to wrap the cheese so that it may be held for about 2 weeks without molding or noticeable loss of moisture. This time will vary with the temperature at which the cheese is held.

Preliminary work has been done on the manufacture of a cheese of the Bel Paese type. This is a milk-flavored, quick-ripening cheese which should be favorably received by American consumers. The early results indicate that it will not be difficult to make.

EVAPORATED MILK

The most serious defect of evaporated milk is the brown coloration with the accompanying cooked flavor imparted to it by sterilization. This has been generally assumed to be due to a caramelization of the milk sugar. Investigations completed in the past year show that the reactions producing this condition are more complicated than have been supposed.

Some of the brown color is due to caramelization and the extent to which this takes place has a direct relation to the reaction of the milk. The presence of certain nitrogen compounds increases the rate of color formation and this reaction is catalyzed by phosphates. Some metals, particularly copper, accelerate this reaction but tin retards it.

Some reducing agents tend to prevent the development of the color while others have no effect. The growth of lactic streptococci, which have a reducing effect, makes a milk with slightly less color than untreated milks. A small amount of sodium bisulphide, a strong reducing agent, entirely prevents the

development of the color. A large part of the brown color develops after the milk is sterilized and its extent is directly proportional to the time and the temperature of storage.

These results do not point the way to any marked improvement in the flavor and color of evaporated milk, but they indicate ways in which the undesirable changes may be minimized. Among these are the avoidance of contamination by metals, particularly copper, and the storage of the sterilized milk at the lowest temperature available.

ICE CREAM

The work on the effect of fat content, gelatin content, and homogenization temperature on viscosity of the frozen cream as measured by the sagging-beam method has been completed and the results are in course of publication.

Some work has been done on the effect of the treatment of ice cream in the freezing process on ice-cream viscosity. The viscosity measurement has been demonstrated to be sufficiently sensitive to indicate very exactly the effects of variations in freezing procedure. This work is not complete, the principal point of interest being that measurements have demonstrated that heat shocking can develop larger ice crystals in the freezer just as it can in the hardening room or storage cabinet. For instance, the ice cream from a mix frozen below the desired drawing temperature, may have a viscosity more than twice that of the same ice cream which during freezing has been brought as quickly as possible to the desired temperature and overrun.

An investigation has been made on the relation of density, that is, the relation of air content to solids, on the palatability and other properties of ice cream. A method has been developed by which the density of the frozen ice cream can be increased to any desired point by compression.

BREEDING, FEEDING, AND MANAGEMENT INVESTIGATIONS

R. R. GRAVES, in charge

THE EXPERIMENTAL BREEDING HERDS AT BELTSVILLE, MD.

PROGRESS OF LINEBREEDING-OUTBREEDING PROJECT WITH HOLSTEIN-FRIESIAN CATTLE

The first outbred generation of 36 daughters, sired by Denton Colantha Sir Rag Apple, has been reduced to 9 head, all of which are past 6 years of age. There are 25 outbred and 5 inbred daughters of Varsity Derby Matador, the second unrelated proved sire, left in the herd. The 9 daughters of the third sire and 5 daughters of the fourth sire remain, and the fifth unrelated proved sire, Chief Piebe Ormsby Burke, now has 14 daughters. The latter are third-, fourth-, and fifth-generation outbreds.

Eighteen daughters of Sire Gerben Colantha Rube make up the first linebred generation, and seven daughters of Pride Ormsby Gerben Colantha Ona are in the second linebred generation.

Inbred daughters of Varsity Derby Matador bred to an inbred son have produced three inbred female offspring.

PROGRESS OF INBREEDING-OUTBREEDING PROJECT WITH JERSEY CATTLE

The Owl-Interest group on this project now consists of 5 daughters of The Moose o'Fernwood, 2 daughters of Double Moose of Sophieson, 10 daughters of Oxford May's Interested Owl, and 5 daughters of Marston's Interested Owl. Two of these 22 daughters are inbred.

In the Sophie Tormentor group are 2 daughters of Hood's Sophie's Tormentor, 11 daughters of Sophie's Torono 23d, 2 daughters of Sophie's Torono Noble Fern, and 16 daughters of Sophie's Phoenix. There are 5 inbreds in this group.

The Raleigh group has 1 daughter of Karnak's Noble 4th, 6 daughters of Tiddledywick's Raleigh, and 12 daughters of Raleigh's Dorothy's Senator, including 1 inbred daughter. The last-named sire died during the year and has not yet been replaced.

PROGRESS OF THE FAMILY-CROSSING EXPERIMENT WITH JERSEY CATTLE

Fourteen females on this project are at Lewisburg, Tenn. At Beltsville there are 1 male in the 2-family group, 4 males and 11 females in the 4-family group, 3 females of 6-family origin, and 6 females descended from 8 distinct families.

OFFICIAL TESTING

During the year 1 mature Holstein cow completed a production record of 20,603 pounds of milk and 779 pounds of butterfat, and 13 Holstein heifers made records which averaged 12,925 pounds of milk and 454 pounds of butterfat, at the average age of 2 years 5 months. To date 110 Holstein cows have made 165 records which average 15,912 pounds of milk and 552 pounds of butterfat. About two-thirds of these records were made by cows less than 5 years old.

Five mature Jersey cows completed production records, averaging 11,082 pounds of milk and 573 pounds of butterfat. Fourteen Jersey heifers completed immature records, averaging 9,271 pounds of milk and 504 pounds of butterfat at the average age of 2 years 6 months. This makes a total to date of 195 records made by 137 Jersey cows which average 10,018 pounds of milk and 543 pounds of butterfat. About one-third of these records were made by cows over 5 years of age.

PROVING BULLS

The number of bulls loaned to cooperators to be proved decreased from 102 to 98, due largely to the elimination of some of the older bulls in the hands of unsatisfactory cooperators. Information was gathered to complete the proof on a number of bulls of both breeds.

RELATION OF THE CONFORMATION AND ANATOMY OF THE DAIRY COW TO HER MILK- AND BUTTERFAT-PRODUCING CAPACITY

ANTE-MORTEM AND POST-MORTEM STUDIES

The measurement of conformation and the slaughter and anatomical study of cows having records of production is the basis on which the interrelations between external form, internal anatomy, and producing capacity are being determined. Nineteen State experiment stations are cooperating with the Bureau on this project. Reports were made on 32 cows having production records during the year. Fourteen of these reports were prepared at the Beltsville station, 5 each at the North Carolina and North Dakota stations, 3 at the South Carolina station and 1 each at the Florida, Massachusetts, Nebraska, South Dakota, and Utah stations. There are now 493 reports on file. In addition, similar data were obtained during the year at the Beltsville station on 4 heifers, 2 freemartins, and 1 cow that had no production record. Many photographs have been prepared during the year to illustrate different steps followed in preparing a post-mortem report. These have been distributed to the cooperating stations to facilitate the work and to insure comparable data from all sources.

CONFORMATION AND GROWTH

In the study of comparative growth and changes in body proportions and conformation of animals throughout their life, which is in progress at the Beltsville station, 266 sets of measurements and contours on 168 different females were made, bringing the total number of sets on file to 2,198. Forty-four similar sets of measurements on bulls also are on file. Measurement records have now been completed to maturity on 75 different cows—18 of these during the year. Many determinations of volumes, body proportions, and factors based on the interrelations of body measurements, have been made for use in future analyses.

Body development and changes in conformation have also been recorded by means of photographs, of which 528 have been added (310 of heifers and 218 of bulls) at definite ages from birth to 12 months. Eighty-four different heifers and 52 bulls were photographed.

STUDIES OF THE UDDER

The comparative study of the development, activity, capacity, gross anatomy, histology, and physical properties of the mammary-gland tissue of different udders has been continued according to the plan previously outlined. During the year 317 observations were made on the mammary-gland growth of heifers ranging from birth to 12 months of age and 28 on heifers at 18 months of age—a total of 345 observations representing 98 different animals. In each case the advancement of mammary-gland development was evaluated on the basis of the standards for the different ages reported in last year's annual report.

Observations on the udders of cows totaled 697 for the year. Two hundred and seven observations were also made on the rudimentary mammary development of 53 different bulls ranging from birth to 12 months of age. In addition photographs were made of the udders of 84 animals including 27 heifers at 18 months of age and 57 cows during lactation or before slaughter.

By filling the secretory system of the amputated udders with fluid and measuring the quantity they would hold, udder capacities were determined for 13 lactating cows, 6 nonlactating cows, 2 heifers that had never been pregnant, 2 freemartins, and 4 miscellaneous udders not included in the above groups, making a total of 27 udder capacities determined during the year, or 215 to date.

During the year new mammary-gland specimens were acquired from 22 cows, 7 heifers, and 1 bull; 29 udders were filled with formalin and frozen for sectioning and photographing; histological studies were commenced on 21 udders; dissections were prepared and photographed for 2 heifers, 2 free-martins, and 1 bull to show the stage of development of the mammary gland at different ages; 67 udders were sectioned for gross-anatomy studies; the sections of 62 udders were photographed; and physical-property studies, which include the determination of sponginess, porosity, fluid-carrying capacity, etc., were conducted on the mammary-gland tissue of 39 udders with comparative tests on a collection of rubber and marine sponges to show the degree of similarity between mammary-gland tissues and sponges. Although individual udders and different areas in the same udder vary markedly, on an average udder tissue, when resoaked, was found to recover practically all of the fluid expressed by a pressure of 50 pounds per square inch, the tissue absorbing a quantity of fluid equal to approximately four times its own pressed weight. This has an important bearing on the importance of size of udder and its capacity for holding milk. The comparative capacity of the udder as measured before the death of the cow and after amputation of the udder was found to be almost identical for one cow studied, but the comparative rate and percentage of recovery of the milk previously injected into the udder were both decidedly lower for the amputated udder than for the same udder before death.

RELEASE OF MILK FROM THE UDDER

The comparative rate at which milk can be obtained from individual udders when milked by machine has been studied according to the plan previously outlined. With cows at or near the third month of lactation, 99 timings on 99 cows have been added. In studying the rate of milk release by the same cows at different stages of lactation, 88 series were completed beyond the ninth month, 38 series were terminated without completion, and 160 new series were commenced during the year. A total of 728 timings have been made to date. The wide individual variations previously reported have been in evidence in this year's work.

In the study of the quantity of milk secreted by the different quarters of the udder and the rate at which milk can be drawn from each of the quarters with a special 4-unit milking machine, 33 reports have been added, on cows at or near the third month of lactation; and 20 series of reports have been commenced, 12 of which have been completed, to determine the changes occurring during lactation, with respect to the comparative performance of each quarter; 47 reports have been prepared during the year, making a total of 52 reports since the beginning of the study. In this phase of the study also great variations have been found, the yield from individual functioning quarters varying from a few tenths of a pound to nearly 50 percent of the entire milking. In most cases the rear quarters yielded the greatest quantity, although in several instances the highest yield came from a front quarter. Often the quarter that gave the greatest quantity was not the fastest milking quarter at the beginning of the milking. In most of the cases studied the quarter having the highest yield at the third month of lactation also had the highest yield when studied 3 and 6 months later, and the same was true for the lowest yield. In some cases the lowest yield was obtained from quarters having a pathological history—in others from quarters for which there was no pathological record. Three of the cows studied have now been slaughtered and the relative capacity of the quarters of their amputated udders was found to be remarkably similar to their proportionate ante-mortem yields.

HEALTH AND FERTILITY STUDIES IN THE BELTSVILLE HERDS

The herds continued to be free of tuberculosis. Two nonpregnant heifers reacted to the agglutination test for Bang's disease and were sent to the abortion-positive herd. Both had been born in that herd.

The abortion-positive herd now consists of 35 females, all of breeding age, and the abortion-negative herd numbers 281 females, of which 212 are of breeding age. In the breeding herds there were 4 deaths due to abscess or injuries, 7 caused by digestive disturbances, 7 by foreign bodies, and 4 by septicemia. Digestive upsets, lameness, and udder troubles most frequently disturb the health of animals.

In the abortion-negative herd a higher percentage of cows bred became pregnant than in the abortive-positive herd. In the number of services per conception there was some improvement in both herds, despite the continued difficulty of getting initial conception in heifers.

One hundred and forty-seven pregnancies were terminated in the abortion-negative herd, of which 104 were in the breeding group. The 104 resulted in 87 live calves, 15 dead calves, and 2 abortions. The dead calves include 4 reabsorptions, 4 too large for dam to deliver, 3 malpresentation, and 4 that were dead when found.

In the abortion-positive herd 34 pregnancies resulted in 27 live calves, 4 dead calves, and 3 abortions. The dead calves included 1 reabsorption, 1 whose dam had milk fever before calving, and 2 that were dead when found.

Studies of the morphology and physiology of spermatozoa were made on 121 samples of semen during the year. These samples were collected from the herd sires, experimental bulls, and bulls loaned to cooperators.

Artificial breeding has been tried by three methods: (1) By collecting material from a cow just bred and placing this material into the vagina of another cow in oestrus; (2) by obtaining semen by massaging the accessory genital organs of the bull and placing the semen into the vagina of a cow in oestrus; and (3) by using semen obtained in the latter way and introducing it into the cervix of the cow in oestrus. This last method gives promise of being the most successful.

FEEDING AND MANAGEMENT INVESTIGATIONS AT BELTSVILLE

GRASS SILAGE

Three small experimental silos were filled with grass four times in 1933. Chopping the grass as it was put in the silos increased the quantity which could be stored in a given space, and improved the odor, appearance, and palatability of the silage. Also, with the type of silo and the kind of machinery commonly used in this country, chopping makes filling easier than putting the grass in without chopping.

Partial drying of the grass after mowing was found advantageous; the grass was easier to handle, a little more could be stored in a given space, and leakage of juices was avoided. Furthermore, the silage from partially dried grass was fully as palatable as that from fresh grass, and it kept perfectly. The permissible range in content of dry matter is considerable—roughly, 35 to 60 percent. Material with a still higher dry-matter content requires special attention in packing and excluding air.

The stage of growth of the grass had a marked influence on the palatability of the silage. The quantity of dry matter consumed in silage made from orchard grass 8 to 10 inches high was about 50 percent greater than that from orchard grass that was heading out. Cows consumed about as much dry matter in the immature grass silage as they would have consumed by grazing similar grass.

INFLUENCE OF CERTAIN CONDITIONS OF STORAGE ON THE COLOR AND PIGMENT CONTENT OF ALFALFA HAY

Six lots each of field-cured and artificially dried alfalfa hay were divided into 84 samples and stored under several different conditions of light, air, and temperature. The well-dried samples when exposed to air maintained their color about as well as when air was excluded; those with a high-moisture content, however, lost more color when sealed than when exposed, probably because when air was excluded they could not dry out. Especially low temperatures and the absence of light helped to preserve the color; in fact, most of the samples stored in the refrigerator sustained no loss in color whatever.

Fifty of the eighty-four samples were analyzed for chlorophyll and carotene. In general the content of pigments varied with the green color, although there were some important exceptions. For example, the samples stored in the barn, either when exposed to the air and diffused light or when buried in hay of the same kind, contained more carotene than those stored in the refrigerator, although the color of those kept at the low temperatures was superior.

In another experiment it was found that alfalfa containing 25 to 35 percent moisture when tightly packed and sealed lost all its green color but retained a carotene content equal to that of no. 1 field-cured alfalfa hay, which suggests the probability that alfalfa silage may likewise have a high carotene content.

ESTIMATING THE ADEQUACY OF PHOSPHORUS IN THE RATION

Although an acute deficiency of phosphorus in cattle feeds has been found only in a few regions of the United States, it is evident from the response of crops to phosphorous fertilization that a large proportion of the soils are deficient in this element. Considerable work has been done on phosphorous metabolism, but as yet the dairyman is almost completely in the dark when he attempts to estimate the adequacy of the phosphorus in a ration. From a study of the literature and from work in this Bureau a method or standard for his use has been prepared. This method, though admittedly tentative, will, nevertheless, give him a basis for calculation and will, it is hoped, induce other investigators to improve on it.

INCOMPLETE MILKING

The investigation regarding the effect of leaving a pound or so of milk in the udder at each milking is nearing completion. While the results cannot yet be thoroughly analyzed, incomplete milking did not lead to udder troubles as judged by frequent physical examinations of the udders, by strip-cup observations, by the content of chlorides in the milk, and by the numbers of leucocytes, bacteria, and streptococci in the milk. Furthermore, incomplete milking did not lead to rapid drying off nor to a lower percentage of fat in the milk. The effect, if any, of incomplete milking on the quantity of milk produced was to reduce it slightly.

PHYSIOLOGICAL RESEARCH AT THE BELTSVILLE LABORATORY

Investigations are in progress which have as their objective the determination, as accurately as is possible, of the exact time of ovulation in the cow. This information would be of considerable help in determining the optimum time for breeding to insure fertilization of the ovum.

Earlier studies on the rabbit have shown that when ovulation occurs and the corpus luteum is formed, the uterus becomes refractive to pituitrin (before ovulation has taken place, the uterus responds to pituitrin with a marked contraction—the typical pituitrin spasm). Also, in the rabbit, the uterus is very active during oestrus, and becomes inactive when the corpus luteum is formed. The studies on the rabbit indicated that, by following the uterine motility and pituitrin effect in the cow, it might be possible to determine time of ovulation without resort to manual manipulation of the ovary through the rectum.

Results so far, although limited because of too few experimental subjects, indicate that the theoretical basis of the experiment is probably correct. The cows studied have shown a marked increase in uterine motility about 2 days before oestrus, the activity of the uterus increasing as oestrus is approached. On the day of oestrus, the uterine motility is very marked and the response to injected pituitrin is also marked. Twenty-four to thirty hours after oestrus has set in, and before ovulation has occurred, as determined by manual manipulation, the uterus still gives the pituitrin response. In the few animals studied at this period of the oestral cycle, when ovulation had occurred the uterus no longer gave a pituitrin response. This indicates that the corpus luteum is already active and is inhibiting the pituitrin response of the uterus. Strangely, like no other mammals so far studied, after the follicle has burst and the corpus luteum is forming, the cow's uterus, though refractive to pituitrin, still shows fairly normal activity. The significance of this difference is not understood at the present time.

The third cow ovum recovered was taken from cow 841 at autopsy, 26 to 30 hours after oestrus had set in, and 24 hours after the animal had been bred to a fertile bull. The ovum was unfertilized and resembled in most

respects the other unfertilized cow ovum found and described by Miller, Swett, Hartman, and Lewis. The ovum was found in the proximal third (next to the uterine horn) of the oviduct, indicating that the estimate of 72 hours for the tubal journey of the cow's egg may be somewhat too long. No spermatozoa were found in either oviduct; this may account for the unfertilized state of the egg. The Beltsville data so far indicate that the journey of the spermatozoa in the cow takes a somewhat longer time than in the other mammals so far studied; they do not arrive at the upper parts of the oviducts much before 24 hours after insemination.

Because of the importance of the pituitary gland in the processes concerned with the initiation and maintenance of the secretion of milk by the mammary gland, studies have been carried out on the effect of the prolactin hormone on the milk production of several cows in the Beltsville herd. Certain Holstein cows which on account of their breeding were expected to be high milk producers have been consistent low producers. It was thought that they might have inherited a pituitary deficiency. This deficiency of the pituitary in these cases was probably limited to the failure to produce prolactin; they grew normally, so their pituitaries were not deficient in the growth-promoting principle. Injection of an extract of the anterior lobe of pituitary glands has partly overcome this deficiency of milk production in several cases. These injections raised the level of production 30 to 50 percent during the 10-day experimental period, but the cows did not maintain the higher level of production after the injections were discontinued. Efforts were made by use of the same type of extracts to start milk secretion again in two cows that had been allowed to go dry for this purpose. The results were practically negative; only very small amounts of milk could be gotten even though large amounts of the prolactin hormone were injected. This same result was obtained with a goat that had gone dry and to which the hormone was given. Injections of the same hormone to a cow producing at a high level resulted in no increase of milk production; rather, it was felt that the injections somewhat disturbed the high levels of production. All these results indicate that, at the present time at least, the prolactin hormone has little commercial application for dairy cattle and that deficiency of milk production brought about by inferior breeding or by genetic mishaps can only be temporarily offset by the administration of large amounts of this hormone.

Injection of the gonad-stimulating hormone of the pituitary into two young bull calves brought about no increase of the size of the testicles. It was found that much care must be taken in the preparation of this principle from human pregnancy urine else a histaminelike reaction is elicited in young cattle. This principle is being tried on older herd sires in an attempt to improve their potency and virility.

Photographs of the various stages of development (the one-cell stage to the germ-disk stage) were made of the egg for purposes of instruction to practical breeders and dairymen. Attempts are being made at this time to photograph with the motion picture camera the actual entrance of the fertilizing spermatozoan into the egg.

WORK AT THE FIELD EXPERIMENT STATIONS

GENERAL

Sharp curtailment in size of the dairy herds to meet reduced-budget allotments has been the general policy for field-station operations. The attempt has been made, however, to keep the breeding and feeding experiments intact. During the fiscal year 167 animals have been removed from the 7 field station dairy herds. Of this number, 84 were young bulls slaughtered shortly after birth, 16 were old bulls sold for slaughter, 5 were bulls that died, 52 were cows sold for slaughter or turned over to other Government agencies for production purposes, and 10 were cows that died or were sold on account of disease.

The number of bulls loaned to cooperators has been curtailed or held stationary and only a sufficient number of bulls to serve as replacements are being raised.

Official testing work has been carried on as usual, a total of 81 official records having been completed during the fiscal year as compared with 55 for the previous year. These records average 10,165 pounds of milk containing 434 pounds of butterfat at an average age of 3 years 5 months.

A feeding experiment at several of the stations in which cows were fed for entire lactation periods on alfalfa hay alone to determine the amount and the relative economy of production on this ration has been concluded and the results are ready for publication. Fifteen cows have completed 24 normal lactation-period records at an average age of 5 years 2 months. Their average production was 10,702 pounds of milk containing 376 pounds of butterfat. Nine of the fifteen cows were fed alfalfa hay exclusively for at least 2 consecutive lactation periods (over 2 years) and 3 of the 15 were fed alfalfa hay exclusively for 3 consecutive lactation periods (over 3 years). The average yearly consumption of alfalfa hay per cow was 14,352 pounds. No breeding trouble that could be ascribed to the exclusive alfalfa ration was noticed. These same cows also made 15 yearly official records under full-feed conditions (hay, grain, silage, and pasture) and on a mature basis produced an average of 19,421 pounds of milk containing 652 pounds of butterfat. These data together with the results of other roughage-feeding experiments carried on by this Bureau, and additional data secured on costs of producing roughage and grain crops, served as the basis for one of the methods considered for curtailing production under the dairy-control program proposed by the Agricultural Adjustment Administration.

Cooperation has been continued with the Department of Justice in an advisory capacity in connection with the operation of their dairy herds maintained at Federal prisons. Several inspection trips were made. A total of 19 bulls owned by this Bureau are now loaned to 7 Federal prisons where they are being proved.

MANDAN, N.DAK., STATION

The herd sire, King Paul Lillian Walker, was sold for slaughter at the age of 11 years, after being used at the Mandan station for 5 years. He was replaced by Friend Ona King Paul Walker from the Huntley (Mont.) station. This bull later reacted to the tuberculin test and was slaughtered. He was in turn replaced by Friend Ona Paul Colantha, a half brother that was also proved at Huntley. Dean Piebe Homestead, a proved bull owned by the North Dakota State Agricultural College, was moved to the Mandan station in exchange for a proved bull from the Huntley station.

Feeding experiments have been reduced to a minimum because of drought conditions resulting in a lack of station-grown feeds and the necessity of curtailing the size of the herd. Pasture experiments and studies of the cost of growing crops are being continued. Thirty-four cattle have been disposed of, including 17 young bulls slaughtered at birth, 2 old bulls, and 15 milking cows which were transferred under agreement to other Government agencies.

Considerable fencing, painting, and repair work was done with Civil Works Administration funds and the straw barn is now being remodeled and enlarged with Public Works Administration funds.

HUNTLEY, MONT., STATION

Although it has been necessary to reduce the size of the Huntley herd to meet the reduced allotment of funds (26 animals having been disposed of), the experimental work has not been curtailed. Sufficient quantities of immature grass hay and silage were harvested to feed several cows for entire lactation periods on these roughages alone.

To date 2 cows have been fed exclusively on grass hay for over 300 days and have consumed an average of 43 pounds per cow per day. Each of these cows will produce close to 400 pounds of butterfat for the year. Three cows on grass silage made from immature pasture grass are consuming at the rate of 80 pounds of silage per day.

An experiment to determine the quality and comparative feeding value of alfalfa hay harvested at different stages of maturity was started.

Three sires were proved at the Huntley station during the year. Two of these were sent to the Mandan, N.Dak., and Woodward, Okla., stations to head the herds there, and the third was sent to the North Dakota State Agricultural College for use in cooperative breeding experiments at that institution.

WOODWARD, OKLA., STATION

King Paul Helena Walker, the Holstein sire used at this station for several years, died. His first 23 daughters have now completed official records with the high average production of 22,169 pounds of milk, containing 726 pounds

of butterfat, calculated to a mature basis. Two of his daughters made immature records of 720 and 726 pounds of butterfat, respectively, during the year. Seven daughters of Sir Bess Rue North Star have calved and are now on test. Friend King Paul Colantha Walker, a sire proved at the Huntley station, was brought to the Woodward station in June.

Drought conditions last summer prevented the production of sufficient Sudan-grass silage to carry out feeding experiments with this roughage. Conditions are no better this summer and it will probably be necessary to postpone these experiments until a good crop of Sudan grass can be produced.

Several fields were terraced during the past winter with Civil Works Administration funds.

JEANERETTE, LA., STATION

Nasal trouble is still prevalent in the dairy herd and is presumably responsible for the low production records. Research to establish the causative agent of this disease is being continued in cooperation with the Bureau of Animal Industry. The disease has also been found in other herds in different sections of the State. The entire herd is being dipped every 14 days for eradication of ticks in keeping with the State-wide tick-fever eradication campaign.

Two groups of cows are being fed for entire lactation periods on artificially dried alfalfa and soybean hay, and on grass silage, respectively. The bull calves placed on artificially-dried roughage alone at six months of age have made satisfactory gains in weight.

A portion of the pasture adjacent to Bayou Teche has been laid off in plots and is being placed under the sprinkler system of irrigation. The yield and carrying capacity of these plots will be compared to other plots not irrigated.

A hurricane late in June did considerable damage to buildings and crops.

The hay barn was enlarged and a bull barn to hold two herd sires was constructed.

PONTIAC, S.C. (SAND-HILL), STATION

A summary was made of the costs involved in clearing the land, fencing, seeding, and fertilizing for the permanent pasture. As compared to the carrying capacity furnished by this pasture the costs of establishing and maintaining it were excessive. The grazing experiment to determine the feasibility of a rotation of annual crops to furnish grazing throughout the year is being continued.

HANNIBAL, MO., STATION (THE HATCH FARM)

The experiment to determine the carrying capacity for milk production and yield of grasses under various systems of pasture fertilization is being continued. Dry weather for 2 years will materially affect the results.

The herd of Jerseys continues to produce at a high level. Nineteen cows have made a total of 23 register-of-merit records since the herd was established. These records averaged 9,947 pounds of milk containing 522 pounds of butterfat at an average age of 3 years 1 month. Lady's Rinda St. Mawes, the proved herd sire, died as a result of impaction. He was replaced by Peggy's Majestic Duke.

A heifer and young stock barn, a bull barn, and an implement shed were constructed, largely with Civil Works Administration funds from the State allotment.

LEWISBURG, TENN., STATION

The experimental work on artificial drying of roughage crops is progressing. Continued dry weather causing a shortage of desirable crops has hampered the work materially. A group of bull calves fed on artificially dried roughage alone from 6 months of age made normal gains.

Breeding troubles in the herd have been reduced materially and the general condition of the herd is the best since it was established. Holger's St. Mawes Noble, the proved Jersey bull, has been returned to service after several months' idleness due to injury. Goldies Torono Lad, another proved sire, is still vigorous at 15 years of age.

Several important fields were terraced last winter, which should materially increase their productiveness.

A barn for hay storage and an implement shed were built, and considerable fencing, repair work, and terracing were done with funds provided through the Civil Works Administration and Public Works Administration.

DIVISION OF MARKET-MILK INVESTIGATIONS

ERNEST KELLY, in charge

COTTONSEED MEAL AND UDDER TROUBLES

Market-milk specialists of this Division cooperated in Bureau studies of the relation of cottonseed-meal feeding and also of incomplete milking to udder troubles. This Division did all the laboratory work, including tests for streptococci, leucocyte counts, determination of the chlorine content, making the catalase test, and a special test for the detection of mastitis. While this special test is probably not yet ready to be put forward as final, it promises to provide a short and simple test for the detection of mastitis. The test consists of adding brom-cresol purple to freshly drawn milk, incubating the mixture for about 24 hours, and then centrifuging the tubes for 2 minutes. Abnormal milk not only gives the color change to a golden yellow but upon centrifuging gives a golden yellow precipitate at the bottom of the tube.

HOMOGENIZED MILK

Certain phases of the study of milk homogenization were finished and the following conclusions were drawn:

Pasteurized homogenized milk is as palatable to the average consumer as is pasteurized milk. Homogenization causes the development of rancidity in raw milk to such an extent that the process cannot be applied to raw milk for commercial purposes. The optimum temperature of homogenization for the development of rancidity in raw milk ranges from 30° to 40° C. (86° to 104° F.).

In handling raw milk care should be taken not to subject it to any process or agitation which might have a homogenizing effect, especially at temperatures within the optimum temperature range for the development of rancidity. In the preparation of homogenized milk for market purposes the milk should be homogenized immediately after being pasteurized, or pasteurized immediately after being homogenized. The homogenization should be done at or above the pasteurizing temperature.

The sediment frequently found in homogenized milk consists largely of leucocytes and epithelial cells. In unhomogenized milk the cells are carried up with the rising fat globules and held in the cream layer. In homogenized milk these cells settle to the bottom. To prevent sedimentation in homogenized milk the milk should be clarified before it is homogenized.

The Babcock test for butterfat gives a slightly lower fat reading for homogenized milk than it does for the same milk before homogenization. Although homogenization slightly lowers the specific gravity of milk, it is not lowered to an extent whereby it materially affects the percentage of total solids as calculated from the specific gravity.

EFFECT OF BUTTERFAT CONTENT AND OF STANDARDIZATION ON THE PALATABILITY OF MILK

Work on this project has been practically completed, with the following conclusions:

The butterfat content is not the predominating factor affecting the palatability of milk. There is a wide range in the ability of individuals to detect a difference in the fat content of milk by taste. Experienced judges of milk are frequently unable to determine which of two milks has the higher fat content by the sense of taste. While a considerable number of consumers are unable to detect a difference in the fat content of milk the majority will choose the milk with the higher fat content.

Disturbing the physical relation of the fat to solids not fat and serum apparently affects the palatability of milk. The palatability of standardized milk is not equal to the palatability of normal milk. In standardizing milk the best results are obtained, from the standpoint of palatability, by mixing two normal milks with different butterfat contents.

EFFECTIVENESS OF CLARIFIER IN REMOVING LEUCOCYTES FROM MILK

Some work has been done to determine the effectiveness of the clarifier in removing leucocytes from milk.

Leucocyte count was made of 46 samples of milk before and after clarifying at 20° C. (68° F.), at the rated speed of the clarifier. The leucocyte count of

these samples was reduced from an average count of 1,064,600 per cubic centimeter before clarifying to an average count of 292,900 per cubic centimeter after clarifying. The above result indicates that on the average approximately 72.5 percent of the leucocytes are removed from milk by clarification.

In order to determine whether or not the number of leucocytes in milk affects the proportion which the clarifier will remove, 10 samples of milk having an average count of 1,509,750 per cubic centimeter were clarified as above. The milk after clarification had an average count of 404,707 per cubic centimeter, a reduction of approximately 73.2 percent. On the other hand, 10 samples having an average count of 651,750 per cubic centimeter before clarifying had a leucocyte content of 197,000 per cubic centimeter after clarification, a reduction of approximately 69.7 percent. These results indicate that a slightly higher percentage of the leucocytes are removed from high-count milk than from low-count milk by clarification.

To show that the speed of the clarifier influences its effectiveness, 22 samples of milk with an average leucocyte count of 1,187,250 per cubic centimeter were clarified at half speed. The milk thus clarified had an average leucocyte count of 651,360 per cubic centimeter, which was a reduction of only approximately 45.1 percent.

DEVONSHIRE CLOTTED CREAM

Experiments have been carried on to reproduce the Devonshire clotted cream, a very heavy, almost solid, cream with a distinctive flavor, which is sold quite extensively in England and British Provinces. In the first attempt, using a hot-water bath for heating the milk, the head of cream was quite thin and weak and there was a considerable quantity of free butterfat. There was also a lack of characteristic flavor. Later the hot-water bath was discarded in favor of a steam bath. This has given more rapid heating, with better temperature control. Under these conditions, the body, texture, and flavor of the clotted cream have been greatly improved. The latest work has been limited to the factory method of manufacture, wherein heavy cream is floated on the top of skim milk. The usual farm method is to heat the whole milk. This latter method tends to develop some acidity in the milk and cream, and a lower fat content in the cream.

MILK-PLANT MANAGEMENT

Further work has been done regarding country receiving stations. Six floor plans for plants ranging from 300 to 6,000 gallons daily capacity have been designed and drawings made by the Bureau of Agricultural Engineering. In addition to the plans, sketches showing the arrangement of floors and rooms have been made. A manuscript on the subject of country plants, which includes not only the matter of plans and lay-out but labor requirements for different size plants handling milk under differing conditions, is being prepared for publication.

Information has been secured and tabulated on the time required to transport milk from the country plant to the cities. Wide time variations have been found in the cities and a further study should be made to learn the reasons for excessive costs in some cases.

Data have also been compiled showing the average quantity of milk handled by country plants, the average number of producers per plant, the average receipts per producer, costs for electric current for mechanical refrigeration, cost of ice at plants which use ice, estimated total cost of operating mechanical refrigeration, capacity of refrigerating equipment, types and sizes of boilers, and division of expenses at four plants where milk is shipped in tank trucks.

A project has been outlined to make a study of the distribution of milk, with a view of determining the causes for varying spreads between farm prices and delivered prices in different cities. The spread varied from as low as 4.7 cents per quart in Milwaukee to 8 cents per quart in New Orleans.

HERD-IMPROVEMENT INVESTIGATIONS

J. C. McDOWELL, in charge

On January 1, 1934, there were 793 dairy herd-improvement associations in active operation in 44 States. The number of cows on test in these associations was 325,837. This is a decline of about 10 percent in the number of associations and 9 percent in the number of cows on test as compared with the preceding year.

The individual records of 163,014 cows in 716 of these associations were received and tabulated. The records received from each association were tabulated and summarized by herds, by associations, and by States and the results, together with an analysis of each summary, were furnished to the respective States from which the records were received. The herd and association summaries showed that the small herds of high-producing cows often brought more profit to their owners than much larger herds of low-producing cows. The high producers eat more per cow but they eat much less than the low producers per 100 pounds of milk and per pound of butterfat. The State summaries showed the relation of milk and butterfat production per cow to feed cost and income over cost of feed; the comparative production of registered and grade cows; and the relation of cost of roughages, cost of grain, and season of freshening to other factors. For a few States in which the feed records were satisfactorily filled out, feed studies are being made showing the results of feeding various amounts of silage, legumes, and concentrates per cow.

Production per cow throughout the United States, according to the Bureau of Agricultural Economics, has declined each year since 1929, but there has been a fairly constant gain in butterfat production per cow in dairy herd-improvement associations each year since the work began in 1906. In 1906 the average butterfat production per cow in these associations was 215 pounds. By 1920 it had advanced to 247 pounds. In 1929 the average yearly butterfat production of the cows on test was 296 pounds per cow; in 1930, 302 pounds; in 1931, 306 pounds; in 1932, 310 pounds; and in 1933, 313 pounds.

A further study of the data indicates that the increased production per cow in recent years has been due to three main causes: (1) The associations that dropped out had a lower production average than those that continued, (2) the herds that dropped out had a lower production average than those that continued, and (3) the herds that continued on test appear to have been more closely culled in 1933 than in former years. In some States an increased production per cow was obtained in 1933 with a greater number of cows on test.

Dairy herd-improvement association work places the emphasis on economical production per cow and not on a greater total production. When low and unprofitable producers are eliminated from each dairy herd the result is and should be a step toward greater profits to the individual dairyman and to the entire dairy industry. The study of the 1933 records shows that, on an average, the cow that produced 400 pounds of butterfat a year returned as much income over cost of feed as 7 cows that produced 100 pounds each; that on an average 1 cow that produced 12,000 pounds of milk brought in as much income over cost of feed as 4 cows that produced 3,000 pounds each; that the registered cows excelled the grades by 635 pounds of milk and by 25 pounds of butterfat per cow; and that the cows that freshened in the fall excelled all others in production of milk and butterfat per cow. For the first time in any comprehensive study of the records, the cows that freshened in the summer surpassed all others in income over cost of feed.

DISCARDED COWS

The total amount of culling in dairy herd-improvement association herds each year appears to be about 20 percent of the herd. About 8 percent of the herd is discarded because of low production; about 7 percent is discarded because of disease or accident, and 5 percent is sold each year for dairy purposes to other dairymen. Dairymen could greatly reduce the tremendous waste that comes from raising unprofitable cows by using good sires and by raising only those heifer calves that have good prospects of becoming high-producing cows.

NEW AGE-CONVERSION FACTORS

In order to make a satisfactory comparison of the records of dams and daughters in bull-proving work, it is necessary to bring all records of immature cows to a mature-production basis through the use of age-conversion factors. As the conversion factors in use were based mostly on advanced-registry records where only the best cows were ordinarily placed on test they were considered unsatisfactory for proving bulls in dairy herd-improvement association work. For that reason new factors have been worked out using dairy herd-improvement association records for the same cows for 2 successive years to determine the age-production curve. This table of age-conversion factors has proved highly satisfactory in the proving of bulls.

PROVED-SIRE INVESTIGATIONS

During the fiscal year most of the proved-sire work was based on lactation records of dams and daughters. During this period 1,859 pairs of dam-and-daughter records were compared, and 249 sires were proved. Of the 249 sires proved, 155 increased butterfat production and 94 decreased production. One hundred and four of these sires were reported living at the time they were proved and 145 were reported dead. Seventy-eight of the living proved sires had daughters whose average butterfat production excelled that of their dams and 26 had daughters whose average production was less than that of their dams. Of the 145 dead sires proved, 77 had daughters whose average production excelled that of their dams and 68 had daughters whose average production was less than that of their dams. Reduced to a percentage basis, 75 percent of the living sires and 53 percent of the dead sires had daughters that excelled their dams in average butterfat production.

Within the past 2 years 100 dairy bulls have each been proved by 10 or more lactation records of dams and daughters. Of these, 62 were registered Holstein-Friesians; 21 were registered Jerseys; 15 were registered Guernseys; and 2 were registered Ayrshires. On an average the dams produced 406 pounds of butterfat and the daughters 448 pounds. Here was a gain of 42 pounds, or a gain of 10.3 percent in butterfat production in one generation. Among these 100 bulls 76 increased production in the herds in which they were used and 24 decreased production. Dairy men cannot be too careful even in the selection of proved sires to head their herds.

BULL ASSOCIATIONS

On January 1, 1934, there were 351 active cooperative dairy bull associations in 26 States. This is nine more associations than were reported in operation January 1, 1933. In the bull associations now active there are 6,171 members who own cooperatively 1,564 registered dairy bulls that are mated annually to more than 53,000 dairy cows.

Most of these bulls were selected on the basis of their pedigrees and very few of them have yet been proved by dam-and-daughter comparisons. There are not yet enough meritorious proved bulls to meet the effective demand for them. Here is one place in the dairy industry where there is no surplus and where there is no likelihood of there being a surplus for many years to come.

DAIRY MANUFACTURING INVESTIGATIONS AND INTRODUCTION

R. W. BELL, in charge

The advice and assistance of members of this Division was sought last year in a greater number of instances than in preceding years, largely due to the fact that various national recovery agencies desired information available within the Division. In addition more than the usual number of individual requests for information were received, relative to the making of butter and the many varieties of cheese, both on the farm and in the factory.

Work has been done at the Grove City Creamery, Grove City, Pa., to obtain more information relating to the manufacture of Swiss cheese, Roquefort cheese, the packaging, curing, and merchandising of American Cheddar cheese in cans, and for other purposes.

All of the Roquefort cheese made at the Grove City Creamery in 1933 from cow's milk was salable and was entirely merchandised before the 1934 cheese was ready for the market.

Several commercial companies this year became interested in the manufacture of Roquefort cheese, because the rates of exchange were such that they believed it would be advantageous to manufacture Roquefort cheese in the United States. Representatives of several companies were present at the Grove City Creamery while cheese was being made in March and April.

CREAMERY INTRODUCTION

The introduction of methods for improving the quality of creamery butter in southern States has enabled creameries that participated in this project to market their butter more advantageously.

This is well illustrated by the experience of three Tennessee creameries situated near a large city in that State. For a number of years these creameries had been able to sell very little butter in the nearby city, because the markets there were already well supplied with low-grade butter such

as they were making. They, however, became active in the quality-improvement work, made butter of satisfactory quality, and last year sold about 700,000 pounds of butter in that city. The increase in the price received for the butter was commensurate with the improvement in quality.

One of these creameries started 2 years ago to sell butter to a retail store in a neighboring town of 3,500 population in which no stores were handling high-quality butter. This better butter was immediately in great demand and at present every store in the town is handling it. Fully 90 percent of the butter consumed in that town now comes from this creamery.

Eight creameries cooperated in shipping their surplus butter in carlots to eastern markets, selling approximately 1 million pounds of butter in this way. The shipments were made during the spring and summer when production was in excess of local demands.

Interest in the quality-improvement campaign has been stimulated by the action of the Federal Food and Drug Administration against cream and butter that do not meet the requirements of the Food and Drugs Act. This is especially true in the case of creameries that operate cream-buying stations, as the quality of cream delivered at such stations has not been improved as much as that delivered directly to local creameries.

As a part of the nation-wide cream-improvement campaign promoted by the American Association of Creamery Butter Manufacturers, Tennessee creamerymen, after numerous conferences, prepared definitions of cream grades to be used throughout the State. They were adopted by 90 percent of the Tennessee creameries.

The Bureau's specialist in Tennessee cooperated with the State dairy commissioner in conducting 15 meetings, held in different parts of the State in order to reach all creamerymen and cream-station operators. Instruction was given on the grading of cream, the production of high-quality cream, and the sanitary requirements of the State dairy law.

Tennessee buttermakers exhibited their skill at several local and national butter scorings. At the Dixie butter scoring the butter exhibited by 13 Tennessee creameries had an average score of 92.46 points, whereas the average score of butter entered by 22 creameries situated in 7 other States was 90.2 points.

In the third annual Tennessee master buttermakers' contest the competitors were required to enter butter in 1 southern and 4 national scorings. The highest average score of the 7 contestants this year was 93.06. In the cold-storage contest, butter from 15 Tennessee creameries was given an average score of 92.8 when fresh and 92.27 after 3 months' storage.

A Bureau specialist made trips to South Carolina, Alabama, and Arkansas in continuation of the project on improvement in quality of creamery butter in those States. At one creamery in South Carolina he demonstrated the relation between quality of cream and quality of butter. The cream, as it was received from the farmers, was graded first, second, or third, on a basis of desirability of flavor for buttermaking, thus forming three lots of cream. Practically all of the cream was a week old. However, some of it had been cared for better than the remainder. Each lot was processed and churned in accordance with good creamery practice. The butter made from the first-grade cream scored 1.25 points higher than that from the second-grade cream, which in turn scored 1.22 points higher than that from the third-grade cream, thus demonstrating that the quality of butter depends primarily on the quality of the cream from which it is made.

In connection with this work some data were obtained that bear on the subject of so-called "double neutralization." In all churnings the acidity of the cream was standardized by adding very slowly a dilute lime mix, commonly called single neutralization. Although the acidities of the 4 lots of third-grade cream were 0.82, 0.96, 1.16, and 1.30 percent, respectively, none of the butter had even a trace of lime or neutralizer flavor. The use of a single neutralizer, if added to properly agitated cream very slowly and in dilute solution or suspension seems no more likely to produce an alkaline flavor in butter than the standardization of acidity by the use of two kinds of alkali, used separately.

INTRODUCTION OF IMPROVED METHODS FOR MAKING SWISS CHEESE

IN OHIO

During 1933 more than 44,000,000 pounds of milk was utilized in the manufacture of culture Swiss cheese in Ohio. This exceeds the amount processed in 1932 by 13,000,000 pounds; an increase of 42 percent. This is evidence that

cheesemakers and factory owners in Ohio are receiving benefits from this project which is carried on primarily to introduce the use of pure cultures. Only members of the Ohio Swiss Cheese Association use cultures supplied by the Bureau. In order to improve their business the members are contributing more funds each year in order to carry on milk quality-improvement work and other desirable activities.

The cheesemakers are becoming more and more convinced of the importance of a uniform temperature in their incubators. Those who have electricity available are converting their oil-burning incubators into electric incubators because a more uniform temperature can be maintained in the latter type.

In an effort to further improve the design of incubators for maintaining cultures at Swiss-cheese factories, the Bureau constructed a demonstration incubator of the water-bath type, with an electric thermostat and heating element. While this incubator is not entirely satisfactory, it has served to point out where improvements can be made. A water-bath type incubator has a number of advantages over the warm-air type. The temperature in the water-bath type is more uniform, other things being equal, than in the warm-air type, since the water is the better conductor of heat; also there is the advantage that it is easier to maintain the temperature of a body of water than to hold constant the heat intensity of a body of air of the same volume, since the heat capacity of the former is greater.

The importance of proper clarification of the milk in making Swiss cheese has been further demonstrated by the fact that most of the factories that have had overset cheese are factories that have had trouble with their clarifiers or that have small machines. These troubles indicate the importance of having equipment large enough to receive and clarify the milk quickly. Several factories plan to replace the smaller machines with larger ones.

During the summer months an extra effort was made, under the direction of the Bureau specialists, to improve the quality of the milk received at the factories. Samples of milk were taken and the methylene blue and fermentation tests and direct bacteria counts were made. This work was done by a senior student of the Ohio State University, and the expense was assumed by the factories where the work was done. An improvement in the quality of the milk delivered to each factory resulted. However, this improvement was noticeable for only 1 to 2 weeks after each meeting. In order to improve and maintain the quality of the milk delivered to Swiss-cheese factories, it is recommended that the milk be paid for on the basis of its quality as indicated by the methylene blue and fermentation tests, as well as on the basis of its fat content.

The variation in the quality of the milk is a difficult problem to overcome. Too often the most inexperienced help takes in the milk, and milk is accepted that obviously should be returned to the producer.

The specialist assisted in conducting a special course for Swiss-cheese manufacturers at the Ohio State University. All cheesemakers who had not had a short course and expected to use pure cultures furnished by the Bureau were required to attend. Much can be accomplished if every cheesemaker who uses pure cultures will attend a short course each winter where he can obtain new information and become better informed regarding practices which are known to be sound.

A record has been kept of the grades of the cheese made since 1931 in the culture Swiss-cheese factories in Ohio. The records indicate clearly that the season of the year and the care taken of the milk have a greater influence on the quality of the cheese than the usual variations in manufacturing methods practiced by the cheesemakers.

The average percentage of cheese made in the different grades during the years 1931, 1932, and 1933 is as follows: Fancy, 3.86 percent; No. 1, 45.25 percent; Special, 26.24 percent; No. 2, 14.79 percent; and Grinders, 9.85 percent.

IN WISCONSIN

Most of the Swiss cheese made in Wisconsin is manufactured in a few counties in the southern part of the State. The methods employed vary a great deal. The following starters are in common use: (1) Lab or nonculture starter; (2) cleared whey starter; (3) raw or pasteurized whey starter, either inoculated with pure cultures, or not inoculated; (4) mixed-milk starter, either bulk inoculated with Ga, with mixed starter, with bulk starter, or with bulk starter and with Ga or mixed culture.

A mixed culture or starter is one which is believed to contain bacilli and cocci in about equal numbers. The Ga starter referred to is *Lactobacillus bulgaricus* with a mycoderma.

All these methods have produced high-quality cheese. On the other hand, factories using these methods have also made poor-quality cheese. Instances are numerous where a change from one starter to another has resulted in good-quality cheese, but too often the cheesemaker incurs great difficulty and expense in locating and correcting the cause of his poor results.

The use of pure cultures would avoid uncertainty inherent in the use of impure cultures such as raw whey starter. Milk, skim milk, or whey for starter making should be sterilized in an autoclave or steam pressure sterilizer for at least 20 minutes at 15 pounds pressure. Heating too long or at too high a steam pressure causes caramelization or browning of the milk or whey. A little browning is not harmful but too much should be avoided. If the containers are left in an airtight autoclave for some time after the steam is turned off, the caramelization or browning will be intensified.

Cheesemakers sometimes clear the whey for starters by the use of acid and high temperatures to remove albumin. This is not necessary. There is usually better growth of bacteria in the cloudy whey.

There are indications that cooling milk in cans in tanks of cold water is preferable to cooling milk with the aid of tubular coolers, evidently because in the latter method the equipment is not cared for so as to prevent contamination in the milk which causes low-grade cheese. One of the factories near Monroe was troubled for several years with pinholey cheese. The farmers had tubular coolers and cooled their milk to 58° F. In the methylene blue tests the dye was not reduced by the milk for nearly 7 hours. In the fermentation test the curd produced was undesirable. At the suggestion of the Bureau's specialist the milk was cooled in cans in tanks containing cold water. As a result the reduction time in the methylene blue test was reduced slightly, and the fermentation test showed a good curd. No pinholey cheese was reported at the factory during 1933.

As a good incubator is extremely important in propagating starters, the Bureau's specialist checked the accuracy of the incubators in about 75 Swiss-cheese factories and made adjustments where necessary. In the electrically heated and controlled incubators the common fault has been to have the heating unit directly under the starter container. Putting the incubators in proper working condition has helped as much in improving the quality of the cheese made in 1933 as has any other factor.

CHEDDAR CHEESE INTRODUCTION

The regular work of assisting State extension men, cheese factory managers, and cheese makers, with manufacturing problems in Southern and Middle Western States, as well as the activities of the cheese specialist at short courses, in judging dairy products at State fairs, and in conducting cheese-making demonstrations, was curtailed during the year. This curtailment was necessary because of extra work in connection with the introduction of methods developed by the Bureau for packaging Cheddar cheese in sealed containers.

The work with the State extension men, cheese factory managers, and cheese makers during the past 7 years has been worth while. Most of the time of the Bureau's specialist heretofore was spent in States that prior to 1927 manufactured practically no cheese. In 1933 these States made 21,000,000 pounds of Cheddar cheese. Neither the State colleges nor the State extension services have had nor do they yet have the personnel to give sufficient assistance on manufacturing problems and on plant-management efficiency to newly organized factories. While the services of the Bureau's cheese specialist at short courses, dairy shows, and farm cheese-making demonstrations are frequently requested, it has not been possible to comply.

During the year the Bureau's cheese specialist supervised the making of several packs of canned Cheddar cheese for companies in position to merchandise this product in consumer units in large volume. These packs were all successful and other packs are scheduled to be made. During the past 2 years over 15,000 prints of green Cheddar cheese have been canned. All of this cheese cured normally and the valves which permit the gases produced during curing to escape from the cans without permitting atmospheric gases to enter, worked perfectly. The canned-cheese project has attracted a great deal of attention among Cheddar cheese manufacturers and distributors. Information on the packaging, curing, and merchandising of Cheddar cheese in a sealed container is available and may be obtained on request.

INSPECTION OF RENOVATED BUTTER FACTORIES

A study was made of all available data pertaining to the manufacture of renovated or process butter. Several field trips were made during the year.

While carrying on the regulatory work, this Bureau learned that much packing-stock butter was being used by other than licensed manufacturers of process butter. Considerable amounts of such butter were being used by ladders and others. After further investigations, which were made in cooperation with representatives of the Bureau of Internal Revenue and the Food and Drug Administration, the Bureau of Internal Revenue rendered a decision that placed ladled butter, as ordinarily made, within the scope of the process butter law. This ruling has done much to clarify existing laws, and will assist this Bureau in carrying on future regulatory work because it more definitely defines what constitutes the making of process butter. Several changes were recommended by this Bureau for incorporation in a proposed revision of the Bureau of Internal Revenue regulations pertaining to renovated or process butter. It will be less difficult to administer the laws relating to renovated or process butter when these changes have been included in the revised regulations.

During the year two process-butter factories discontinued operation—the Beatrice Creamery Co., Topeka, Kans., and R. E. Cobb Co., St. Paul, Minn. Two new concerns qualified to make process butter and were licensed by the Bureau of Internal Revenue. The Hanover Food Products Co., Inc., Baltimore, Md., started operation on April 25, 1934, and the Rosemary Creamery Co., Atlanta, Ga., on June 25, 1934. Inspection work was inaugurated at both of these factories through the usual cooperative arrangement with the Meat Inspection Division of the Bureau of Animal Industry.

The total amount of process butter produced during the fiscal year was 1,221,166 pounds. This is an increase over the preceding fiscal year of 119,035 pounds.

At the close of the fiscal year there were five licensed process-butter factories operating in the United States. Seven factories were in operation during part of the year.

EDITORIAL AND INFORMATION WORK

L. S. RICHARDSON, in charge

During the year 16 publications were printed, 12 of which were new and 4 were revisions of existing publications. At the end of the year 5 manuscripts were being prepared for publication. Fifteen publications were also reprinted one or more times during the year. These publications and manuscripts represent the various research and service activities of the Bureau and are both scientific and popular in character.

Forty-eight articles prepared by members of the Bureau were published in dairy and agricultural publications and in scientific journals outside the Department, and seven articles were contributed to the 1934 Yearbook of the Department. Members of the Bureau also collaborated with the Bureaus of Plant Industry and Animal Industry in the preparation of a pasture handbook which was given wide distribution in connection with the Department's program for encouraging the greater use of pastures in livestock farming.

Eleven publications covering subjects of an emergency nature or of pressing interest to the dairy industry were issued in mimeograph form, and 26 news releases covering the activities of the Bureau were issued through the Department press service. Assistance was given in the preparation and delivery of 16 radio broadcasts on dairy subjects through the Department radio service, and information was supplied to the office of exhibits for the preparation of dairy exhibits at the Dairy Cattle Congress, Waterloo, Iowa, and at various State and interstate fairs.

PUBLICATIONS

The following articles and Department publications written by workers in the Bureau were issued during the fiscal year. FEEDING AND NUTRITION Some effects of different kinds of hay in the ration on the performance of dairy cows. E. B. Meigs, and H. T. Converse. Jour. Dairy Sci. 16: 317-328.	Carotene and vitamin A in dairy feeds. E. A. Kane. Abs. Papers Ann. Meeting Amer. Dairy Sci. Assoc. 1934: 31. Carotene and vitamin A in the nutrition of dairy calves. H. T. Converse, and E. B. Meigs. Abs. Papers Ann. Meeting Amer. Dairy Sci. Assoc. 1934: 32.
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- Roughage rations for dairy cows make less milk and more profit. R. R. Graves, and J. B. Shepherd. *U.S. Dept. Agr. Bur. Dairy Indus.* [Roughage Feed. Ser. 2. B.D.I.M. 626.] (Mimeographed.)
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- The calcifying properties of green, artificially dried, and sun-cured pasture herbage. R. E. Hodgson, and J. C. Knott. *U.S. Dept. Agr. Jour. Agr. Research* 48: 439-446. (With Wash. Agr. Expt. Sta.)
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REPORT OF THE CHIEF OF THE BUREAU OF ENTOMOLOGY, 1934

UNITED STATES DEPARTMENT OF AGRICULTURE,
BUREAU OF ENTOMOLOGY,
Washington, D.C., August 31, 1934.

SIR: I submit herewith a report of the work of the Bureau of Entomology for the fiscal year ended June 30, 1934.

Respectfully,

LEE A. STRONG, *Chief.*

HON. HENRY A. WALLACE,
Secretary of Agriculture.

On September 30, 1933, C. L. Marlatt, who had been Chief of the Bureau of Entomology since October 16, 1927, reached retirement age and left the service after 45 years in the Department of Agriculture.

CHANGES IN PERSONNEL

On January 16, 1934, P. N. Annand was made chief of the Division of Cereal and Forage Insects and W. H. Larrimer was given charge of the cereal and forage insects laboratory at Arlington Experiment Farm. The act carrying appropriations for the fiscal year 1935 provided for the consolidation of the Bureau of Entomology and the Bureau of Plant Quarantine effective July 1, 1934, the new bureau to be known as the Bureau of Entomology and Plant Quarantine. On January 1, 1934, by order of the Secretary, there were transferred to the Bureau of Entomology those functions in the Bureau of Plant Industry concerning the control and eradication of plant diseases and this work also is consolidated in the Bureau of Entomology and Plant Quarantine. A Division of Plant Disease Control was created with Karl F. Kellerman, formerly associate chief of the Bureau of Plant Industry, as chief of the division. In this reorganization, the work of the Division of Stored Product and Household Insects was reassigned to other divisions in the Bureau and the Division of Stored Product and Household Insects as such was eliminated. E. A. Back, formerly in charge of that division, was transferred with the work on household insects to the Division of Insects Affecting Man and Animals. These changes became effective during the fiscal year covered by this report.

INSECTS AFFECTING MAN AND ANIMALS

The work in this division is under the direction of F. C. Bishopp.

One of the outstanding activities in this division during the past year was the large-scale mosquito-control program undertaken under the authority of the Civil Works Administration. This Bureau has indicated in the past that pest mosquito-control work was perfectly practical on a large scale and this was demonstrated in the program mentioned. The program was carried out in 32 States and the District of Columbia, in most cases the State entomologist acting as State director of operations under Federal supervision. Over 1,030 miles of ditches were dug, about 400 miles of stream banks were cleared, deepened, and straightened, dikes to the extent of 53,020 feet were thrown up, and metal and concrete culverts to the extent of 7,566 feet were put in. Fifty tide gates were installed and about 400,000 cubic yards of dirt and rock were removed in the

dredging, filling, and excavating work. Brushy flood areas totalling approximately 7,600 acres were cleared, and approximately 11,000 feet of tile drains were installed.

Carried along with this program was some work on salt-marsh sand flies in the State of Georgia, this being the first known attempt in the history of economic entomology to control this insect. The results show the practicability of control measures and demonstrate the beneficial results.

The cattle grub continues to assess a heavy tax on the cattle raisers, dairymen, packers, tanners, and dealers in hides and leather. The most vulnerable point of attack is upon the grubs in the cysts under the skin of the backs of the cattle. Field work has been directed, therefore, toward developing a larvicide which would be high in efficiency, simple and speedy in application, greaseless to coat of animals, and aseptic.

Serious annoyance of botflies to horses and the injury produced by the bots within the animals has led to the inauguration of control operations. In connection with these control efforts, the need of a more complete knowledge of the life history and habits of the bots became apparent and biological work along these lines has been carried on in Iowa by this division. These studies have developed some rather surprising information which has led to more simple and probably more effective control methods.

Investigations were continued on the American dog tick (*Dermacentor variabilis* Say), which is the principal vector, in the Central and Eastern States, of the disease of man known as Rocky Mountain spotted fever. A Federal Civil Works Administration project in the States of Delaware, Maryland, and Virginia, and the District of Columbia during the past winter gave an opportunity to gather information on the value of clearing up undergrowth and of destroying the small animal hosts in the control of this tick.

Screw worm infestation of livestock in Georgia and Florida was reported for the first time in 1933. Similar infestations in the current year over somewhat wider extent of territory indicate that in this general region the pest has become permanently established. A general survey of the infested area, including the distribution and abundance of the parasites and predators of the screw worm, has been made by the Bureau and advice concerning control measures has been given State and local authorities. The large-scale trapping experiments which have been conducted in Menard County, Tex., were discontinued at the end of the 1933 summer season. E. C. Cushing of the Menard, Tex., laboratory, in collaboration with W. S. Patton, the English medical entomologist, discovered that two species of screw worms, previously undifferentiated, are present over the infested area in this country. Recent field work indicates that the habits and destructiveness of the two species differ widely. This discovery will undoubtedly prove to be of far-reaching importance in connection with the screw worm problem.

Severe outbreaks of buffalo gnats or black flies were reported from the lower Mississippi Valley, where hundreds of mules were killed by this insect. Studies are urgently needed to work out practical and effective control measures.

Work was continued on the eye gnat until the close of the fiscal year, when it was discontinued on account of lack of funds.

Investigations on maggots for use in treating infections of human beings have yielded a method of rearing and shipping which is much simpler and cheaper than those previously employed. This will doubtless result in the more extensive use of this highly successful treatment.

JAPANESE AND ASIATIC BEETLE INVESTIGATIONS

The work in this division is under the direction of C. H. Hadley.

A committee consisting of W. C. O'Kane, deputy commissioner of the Department of Agriculture of New Hampshire, chairman; W. E. Britton, State entomologist of Connecticut; T. J. Headlee, State entomologist of New Jersey; H. B. Weiss, chief, Bureau of Statistics and Inspection of New Jersey; P. J. Parrott of the New York State Agricultural Experiment Station, and Charles H. Richardson of Iowa State College was appointed in January 1934 to make a survey of the work of this division. The committee found the work progressing satisfactorily but recommended that certain lines, notably the insecticide work, be strengthened.

The winter of 1933-34 in the area where the Japanese beetle is prevalent was characterized by abnormally low temperatures and heavy snows. Contrary to the general impression, however, there is no evidence that the cold winter weather caused any marked reduction in the grub population throughout the area as a whole. Considerable progress has been made during the year in the colonization

of imported parasites of the Japanese beetle at a number of points in the generally infested area. Further studies of mechanical traps for catching Japanese beetles resulted in developing greater efficiency in this work. Tests with the cheaper grades of geraniol as the primary bait for Japanese beetle traps have shown that some of the cheaper grades are as attractive to the beetle as the more expensive grades heretofore recommended.

Work was continued in the effort to develop effective stomach-poison insecticides for the Japanese beetle. Investigations as to the tolerance to chemical treatments of certain types of nursery plants were also continued in order to assist in the movement of plants from the infested area to noninfested areas without the danger of carrying infestations.

The Asiatic garden beetle (*Autoserica castanea* Arrow) continued to spread to the westward on Long Island and in Westchester County, N.Y., and in suburban areas immediately adjacent to Philadelphia. The insect was found for the first time in both the northern and central sections of New Jersey. The remarkably low temperatures experienced on Long Island and other areas of general infestation failed to bring about any noticeable reduction of the larval population of the insect.

BEE CULTURE

The work in this division, which is under the direction of J. I. Hambleton, covers phases of apiary management, honey and wax production, and also the use of honeybees in the pollination of orchard and farm crops. A survey of honey-production cost and management was made during the past year in cooperation with the University of California. A similar study was made in cooperation with the Oregon Agricultural College as well as in the white-clover region around the Great Lakes.

In cooperation with the Railway Express Co., a number of trial shipments of package bees have been made from shipping points in the South to destinations in the North in an effort to ascertain the causes of heavy losses of package bees and queens in transit. This study was undertaken at the request of the express agency and the shippers of package bees.

Bacteriological work has been continued on *Bacillus alvei* and *B. para-alvei*, the causative organisms in European foulbrood and parafoolbrood. No new outbreak of parafoolbrood has been reported during the past year and information received from the State apiary inspectors in States in which this disease has been found indicates that an encouraging degree of control has been obtained when control methods effective in European foulbrood have been adopted.

More than half of the several hundred samples of disease diagnosed at the Somerset, Md., laboratory have proved to be American foulbrood, indicating that in spite of the general adoption of the plan to burn infected colonies, the disease still continues to exact a heavy toll of colonies. With less money available in the States for bee-disease control, it would appear that the bee-disease situation is apt to get worse. Studies have been continued of the behavior of bees in California in connection with the pollination of deciduous fruits.

INSECT PEST SURVEY AND PUBLIC RELATIONS

The work in this division is under the direction of J. A. Hyslop.

INSECT PEST SURVEY

The object of the survey is to collect detailed information on the distribution and abundance of insect pests and to study these data in relation to the ecological factors which might be used in forecasting insect outbreaks. For example, in the Summary of the Insect Pest Survey Bulletin for 1933, maps were published showing the regions likely to be severely infested by grasshoppers and chinch bugs, which were used in putting on control campaigns this year with special funds appropriated by Congress. These data, particularly the file on foreign pests, are also of value in regulatory work. During the year about 18,700 notes, of which 11,700 were on domestic and 7,000 on foreign pests, were added to the files, bringing the total number of notes up to 207,000.

The monthly Insect Pest Survey Bulletin, including an annual summary of insect conditions, and an index to the bulletin were published. Maps on the distribution of insects were prepared; and publicity work, including the press, radio, exhibits, and motion pictures, was carried on by this office. Fifty clip-

sheet items were issued; 36 entomological articles were released to the newspapers; and 10 talks on entomological subjects were prepared by the Bureau for use in radio broadcasting.

PUBLIC RELATIONS

This office acted as the contact organization for cooperative extension work in entomology between this Bureau and the Office of Cooperative Extension Work. Three extension entomologists were employed part of the year and one the entire year. In addition to regular subject-matter specialist work, these men assisted in the grasshopper, chinch bug, horse bot, and screw worm control campaigns put on by the Bureau during the year.

FOREIGN PARASITE INTRODUCTION

The work in this division is under the direction of C. P. Clausen.

ORIENTAL FRUIT MOTH PARASITES

The importation of parasites of the oriental fruit moth from Japan and Chosen (Korea) was continued during the year. During this period a total of 12,931 adults and immature stages of 12 species of parasites were forwarded to the United States. In addition to these, 120,462 field-collected larvae in cocoons were shipped. The parasites contained in this material were reared out at the fruit moth laboratory at Moorestown, N.J.

JAPANESE AND ASIATIC BEETLE PARASITES

Rearings and collections of several species of parasites were continued on a relatively small scale. Of the parasites of the Japanese beetle, 6,165 puparia of the tachinid fly *Centeter cinerea* Aldrich and 28,380 reared cocoons of *Tiphia vernalis* Rohwer were shipped to the United States. In addition, 5,066 reared cocoons of *Tiphia* sp., parasitic upon the Asiatic garden beetle, and 2,909 adult females of another unnamed *Tiphia*, which attacks the grubs of the imported *Serica*, were forwarded for colonization.

ELM LEAF BEETLE PARASITES

Due to the consistent failure of the European egg parasite of the elm leaf beetle to become established in the United States, an effort is being made to secure the Japanese form (*Tetrastichus* sp.) which attacks the eggs of the beetle in Japan. A total of 1,112 field-collected egg masses were forwarded, and the parasites will be colonized in California under a cooperative arrangement with the State experiment station.

SHIPMENTS OF PARASITES TO FOREIGN COUNTRIES

Assistance has been given to the entomological organizations of a number of foreign countries in the distribution and colonization of various insect parasites of which they have requested shipments. The list of pests, with the parasite species and the countries to which they were forwarded, is shown in table 1.

TABLE 1.—*Pest parasites shipped to foreign countries*

Pest	Parasites	Country
Oriental fruit moth.....	<i>Trichogramma minutum</i> Riley..... <i>Macrocentrus ancyliovorus</i> Roh..... <i>Macrocentrus delicatus</i> Cress..... <i>Glypta rufiscutellaris</i> Cress..... <i>Pristomerus ocellatus</i> Cushman.....	Canada. Italy, Japan. Italy. Japan. Do.
Pink bollworm.....	<i>Microbracon brevicornis</i> Wesm.....	Mexico.
Codling moth.....	<i>Ascogaster carpocapsae</i> Vier..... <i>Phanerotoma tibialis</i> Hald.....	Canada. New Zealand.
Woolly apple aphid.....	<i>Aphelinus mali</i> Hald.....	Colombia, Costa Rica.
White grubs.....	<i>Scolia manilae</i> Ashm.....	Mauritius.

COTTON INSECTS

The work in this division is under the direction of R. W. Harned.

A committee consisting of W. E. Hinds, entomologist of the Louisiana Experiment Station, chairman; Z. P. Metcalf, entomologist of the North Carolina Experiment Station; S. Marcovitch, entomologist of the Tennessee Experiment Station; and M. S. Yeomans, State entomologist of Georgia, was appointed in January 1934 to make a thorough survey of the work of the Division of Cotton Insects. The committee spent several weeks in an intensive study of the cotton-insect investigations. After surveying the work at the field stations and conferring with the men in charge of each activity, the committee submitted a comprehensive report containing many helpful suggestions and recommendations. The following is quoted from the report of the committee:

The laboratories and offices of the Bureau stations were carefully inspected and found in excellent condition. Every facility was given the committee to go into the work in every detail. The committee is strongly impressed with the soundness and importance of the Bureau program on cotton insect control. Unquestionably this program includes all insect species which might be classed as of highest importance generally in connection with the production of cotton. In no case is a project involved which might be considered as strictly local in importance. Every project, except *Thurberia weevil*, involves insect damage in two or more States, and most of the projects are of distinct importance throughout the entire Cotton Belt.

In no State did the bollweevil cause as much loss in 1933 as in 1932 but weevils increased in numbers late in the season and in many sections the fall population was greater than normal. Low temperatures during the winter of 1933-34 caused low survival of weevils in the Carolinas, while, due to the mild winter in Louisiana and adjoining States, the survival there was high.

During 1934 the bollweevil infestations were spotted. The heaviest infestation developed in Louisiana, Mississippi, and southern Arkansas. Here the early prospect of unusual abundance of bollweevils and the prospect of better prices for cotton caused more general use of calcium arsenate to control the weevil than for several years past and many airplane dusters were used.

The plats dusted with calcium arsenate at Tallulah, La., gave an average increase of 419 pounds of seed cotton per acre, or 45.4 percent. Mixtures of calcium arsenate and paris green and calcium arsenate and copper arsenite also gave good results. At Florence, S.C., a mixture of equal parts of hydrated lime and calcium arsenate gave as good results when used at the rate of 8 pounds per acre as pure calcium arsenate at the rate of 7 pounds per acre, and a mixture of 1 part calcium arsenate and 2 parts of hydrated lime at the rate of 9 pounds per acre gave promising results. The results obtained in South Carolina from these mixtures, if verified by future experiments, will help the cotton growers of that State by reducing expenditures for calcium arsenate, by reducing the danger of soil injury from arsenic, and by reducing the danger of plant lice infestations that often follow heavy dosages of calcium arsenate.

To determine the effect on succeeding crops of the application of calcium arsenate to the soil, for the third year in succession it was applied to a plat at Tallulah, La., at the rate of 400 pounds per acre. The yield in 1933 was at the rate of 1,501 pounds of seed cotton per acre and the yield on the untreated check plat was 1,459 pounds.

Because of the saving in labor that would be made if cotton could be dusted and cultivated at the same time, there is a persistent demand for a method of doing this. In tests conducted at Tallulah about half as much increase in yield was obtained in the plats dusted during the daytime with a duster attached to a riding cultivator as when the dust was applied when dew was on the plants.

Microbracon mellitor was by far the most abundant bollweevil parasite reared at the different stations. *Eurytoma tylodermais* and *Catolaccus hunteri* were next in importance of the 13 species reared.

Cultural control of the pink bollworm by plowing under crop debris in early winter, followed immediately by irrigation, again substantiated previous results of a very high mortality of overwintering larvae as shown by soil examinations. Breeding and colonization work with two species of pink bollworm parasites has been continued. A total of 25,000 *Microbracon brevicornis* were liberated in 1933 at 5 points, 1 in the Laguna district of Mexico and 4 in the Big Bend district of Texas. Releases of over 3,000 adults of *Exeristes roborator* were made in one field at Presidio during September and October 1933. Of a number of insecticides tested to determine the possibility of killing small pink bollworm larvae several gave promising results.

In the tests at Port Lavaca, Tex., in 1933, sulphur dust again proved to be the best and most economical means of controlling the cotton fleahopper. A new experiment in controlling fleahoppers by destroying the principal overwintering

host plant was tried during the winter. Practically all croton plants were cut and burned on 10,000 acres in Calhoun County, Tex., with funds supplied by the Civil Works Administration of Texas. The hopper population was reduced during April and May within the clean-up area as compared to the previous year, as well as in comparison to the numbers present in adjacent counties. However, by the latter part of May, when the cotton was beginning to fruit, there was a large influx of hoppers from outside areas.

The bollworm still remains an insidious pest, as it is not yet understood what factors cause serious sporadic outbreaks. It occurs wherever cotton is grown in the United States but is more serious west of the Mississippi River. Although the infestations in the experimental fields near College Station, Tex., remained very low in 1933 and did not reach 18 percent in any plot, in 14 of the 15 plots dusted with calcium arsenate there was an increase in yield.

Observations made over a number of years show that the *Thurberia* weevil readily transfers to cotton in sufficient numbers to cause commercial damage when grown contiguous to infested *Thurberia* plants. Dusting with calcium arsenate, as for the bollweevil, gave satisfactory control. In irrigated fields the weevils can be controlled by cleaning the fields in the fall, followed by thorough cultivation and irrigation in the winter or early spring.

No evidence has been discovered that insects aid in the dissemination of Texas root rot of cotton. The cotton wilt fungus was found to pass in a viable condition through the alimentary tract of a number of insects commonly present in cotton fields, including several species of grasshoppers and caterpillars and the larvae of several beetles. The grasshoppers may spread the wilt fungus.

A new line of investigation is a study of the life history and habits of the cotton root aphid in the hope of developing practical control measures. Each year in sections of the Carolinas many young plants are killed or seriously stunted by these insects.

Studies of the life history, habits, and control of the field cricket were completed and a manuscript prepared for publication. This pest at times inflicts serious damage to young cotton plants during dry periods by feeding on the leaves and terminal buds, and on the cottonseed in open bolls.

INSECTS AFFECTING FORESTS, INCLUDING THE GYPSY MOTH AND OTHER MOTHS

The work in this division is under the direction of F. C. Craighead.

COOPERATIVE SERVICE

One of the most important activities of the Division of Forest Insects is its cooperation in insect control with the several Government agencies administering timberlands, such as the Forest Service, National Park Service, Bureau of Indian Affairs, and with such emergency agencies as the Civilian Conservation Corps, the Civil Works Administration, and the conservation program of the National Recovery Administration. Private owners were also aided to a less degree. For the most part this cooperative service consisted in surveys of bark beetle infestations, estimating of losses, recommendations as to methods of control, and furnishing estimates of the cost of such operations.

CONTROL PROGRAMS

The labor made available by emergency relief was applied insofar as practicable to the control of the more serious insect epidemics in which it seemed certain that beneficial results would be secured. Thus 22 of the C.C.C. camps in California undertook bark beetle control work and in the course of the period from July 1, 1933, to April 1, 1934, 9,200 trees with a volume of 8½ million board feet were treated, protecting 350,000 acres of forest. In connection with this work it was necessary to recruit and train about 40 technical men as spotters and insect-control foremen. In addition to the C.C.C. program, control work carried on in various regions under N.R.A. and C.W.A. funds was furnished with expert assistance and advice. In the northern Pacific States and in the northern Rocky Mountains projects against several species of pine-destroying beetles were continued in forests where the high brood mortality due to the excessive cold of the winter of 1932-33 had not rendered such action unnecessary.

In the Eastern States, control work was carried on by C.C.C. camps and C.W.A. labor against various forest and shade-tree insects including the white

pine weevil, European pine shoot moth, gypsy moth, southern pine beetle, and the European elm bark beetle, the latter in connection with the Dutch elm disease eradication campaign.

REGIONAL SURVEYS OF BARK BEETLE INFESTATIONS

The insect-control surveys of the western forest regions, upon which the annual loss is computed and the trend of the infestation is based, were made this year as usual. Much assistance was obtained this year from spotters and control foremen of C.C.C. camps. In some cases some of the more intelligent and interested enlisted personnel of the camps were used.

In general the 1933 survey indicated a reduction in losses in many of the western forests, while in a few an actual increase was recorded. In California the drop in timber losses, while by no means uniform, averaged about 45 percent reduction for the State, and in the northern Pacific States a similar condition was found.

RESEARCH ACTIVITIES

Research activities leading to the development of more efficient and economical control methods against western bark beetles have continued and have resulted in several slight modifications of previous methods. In the East the projects on the southern pine beetle, white pine weevil, locust borer, and other forest insects have been continued and emergency investigations of several other tree pests have been started.

The greatly increased demand for planting stock due to the various afforestation projects of the emergency program has made imperative the control of white grubs both in nurseries and in plantations. A thorough investigation of the problem is now under way which involves not only the study of the biologies and life histories of the several species involved, but also the development of soil poisons which will kill the grubs, but at the same time will not injure the young trees.

A study of possible insect vectors of the recently introduced Dutch elm disease, in cooperation with the Bureau of Plant Industry and conducted under emergency funds from emergency conservation work sources, was started last fall and much expanded this spring. Other cooperating agencies are the New Jersey Agricultural Experiment Station and the Boyce Thompson Institute. The work has not yet resulted in conclusive proof that any of the insects tested are agents in disease transmittal, although experimental work has been done with several, including *Scolytus multistriatus*, *Saperda tridentata*, *Hylurgopinus rufipes*, and *Magdalis* spp. Evidence points to *S. multistriatus* as the most probable vector but positive proof of such a role has not yet been obtained.

Another introduced insect is the subject of investigation in the Northeastern States. This is the beech coccus, which in association with a fungus has caused the death of many beeches in eastern Canada, and during the last few years has spread rapidly in several New England States. In Maine the beech scale, as is also true of several other important tree insects, suffered a nearly 100-percent mortality where it occurred above the snow line, due to the unusually low temperatures of last winter.

CEREAL AND FORAGE INSECTS

The work in this division is under the direction of P. N. Annand.

GRASSHOPPERS

A detailed survey of the abundance of grasshopper eggs was conducted in the fall of 1933 in cooperation with the States of North Dakota, South Dakota, Minnesota, Wisconsin, Wyoming, Montana, and Idaho. The survey indicated that a very severe infestation of grasshoppers could be expected in the spring of 1934, and on this basis Congress made an appropriation of \$2,354,893 for control. The infestation which developed was extremely severe in the States surveyed and infestations requiring control measures also developed in Michigan, Nebraska, Colorado, Utah, Oregon, California, Nevada, Arizona, New Mexico, Kansas, and Iowa. A total of approximately 78,000 tons of poison bran bait was purchased and distributed to the States on the basis of the area infested. The weather during early spring remained cold and generally dry but turned unusually hot during the last of May. This resulted in an enormous hatch of grasshoppers which moved immediately into the cultivated crops and made

necessary repeated applications of bait. The severe drought condition and the poor crop outlook made many farmers unwilling to distribute bait for the control of grasshoppers in areas where no crops were in prospect but, in spite of these unfavorable conditions, satisfactory control was secured pretty largely over the infested area.

The possible substitution of oil for water in grasshopper bait has been further investigated during the present outbreak. It was found this year that the success of the oil bait is dependent in part on the absence of sulphur compounds from the oil used in the mixture. Unsatisfactory results were obtained with some types of oil. It is believed, however, that the cause of this difficulty is now known and the substitution of oil for water in the bait may become generally advantageous in the near future.

MORMON CRICKETS

Outbreaks of the Mormon cricket developed over considerably larger areas than was the case last year. A part of the Custer National Forest was involved in the Mormon cricket outbreak where some 10,000 acres were dusted with arsenicals in the attempt to destroy the marching bands of crickets. Although these were greatly reduced, their extermination was not accomplished and it is believed that further trouble may be expected in the spring of 1935. Infestations of this pest also occurred in southern Washington, and in Oregon, Wyoming, and Colorado.

CHINCH BUGS

The first brood of chinch bugs in the spring of 1934, after doing severe injury to small grains, threatened extensive migration to corn and consequent injury throughout the wide areas in the Missouri and Mississippi River basins. Severe infestation of small grains occurred in Illinois, Missouri, Kansas, Iowa, and Indiana. Lighter infestations occurred in Minnesota, Michigan, Ohio, Oklahoma, and Nebraska. Recognizing the emergency nature of this situation, Congress appropriated \$1,000,000 for the purchase and distribution of material to control chinch bugs. The appropriation became available on June 7, too late for maximum effectiveness since migration from the small grain to corn began the first week of June in many localities. However, more than 6,000,000 gallons of creosote were purchased and distributed and the use of this material in the erection of chinch bug barriers served to save most of the corn from attacks of the first brood, except where invasion of the corn had already taken place. The campaign, as a whole, is considered to have been successful in preventing general severe damage to corn by the first brood and to have demonstrated the effectiveness of the method under conditions of severe infestation.

EUROPEAN CORN BORER

On account of reduced appropriations, the entire European corn borer research program has been reorganized, only those phases being retained that show the greatest promise of practical returns in the near future. These phases include breeding of corn for tolerance and resistance to borer attack, redistribution of the more effective parasites, mechanical and cultural control, and insecticidal control in the more valuable sweet-corn areas, particularly in New England.

SUGARCANE INSECTS

Although the sugarcane beetle (*Eueltheola rugiceps* Lec.) is one of the oldest and most injurious pests of the sugarcane in this country, little satisfactory progress has hitherto been made toward its control. It was conservatively estimated that in the spring of 1933 it caused a total loss of at least 25,000 tons of cane in Louisiana alone. Renewed efforts are being made to bring this well-known pest under control, either by artificial or biological control. An effort is being made to establish a parasite which is known to be effective in Puerto Rico on similar beetles and several shipments were made this summer and released in Louisiana. A new vector of cane mosaic (*Aphis bituberculata*) has been discovered at Houma, La., by J. W. Ingram, who is working in cooperation with the Bureau of Plant Industry.

WHITE GRUBS

White grub infestation has continued to progress in importance and presents a problem of major proportions, especially in Wisconsin, Minnesota, and Iowa,

where conditions during the past several years have been steadily growing worse. Serious damage to both pasture lands and cultivated crops over wide areas has been reported from these States.

ALFALFA SNOUT BEETLE

A new alfalfa pest (*Brachyrhinus ligustici* Linn.) of possible major importance has become established near Oswego, N.Y. This insect is a native of central and northern Europe and the grubs of the insect, which is a robust, hard-shelled snout beetle, were found inflicting serious injury to the roots of the alfalfa plants in New York. This was the first recorded appearance of the pest in North America. Surveys made in the spring of 1934 have shown that at least 60 square miles are infested and measures for its control are being studied.

FLEA BEETLES AND STEWART'S DISEASE OF CORN

During the past two seasons a cooperative project between the Bureau of Entomology and the Bureau of Plant Industry has been in progress and the results show that a common and widely distributed flea beetle (*Chaetocnema pulicaria*) which hibernates as an adult and feeds on young corn in the spring carries the organism of Stewart's disease over the winter in its digestive tract and inoculates the corn with this disease. It is suspected that other species of insects may be involved in this process and further studies are progressing to determine this point.

RANGE CATERPILLAR

Work is being continued on the range caterpillar to determine the possibility of controlling it in northern New Mexico by the production and release of parasites on the ranges in the spring. Work is also going forward on the alfalfa aphid in cooperation with the various States and the Bureau of Plant Industry.

IDENTIFICATION AND CLASSIFICATION OF INSECTS

The work in this division is under the direction of Harold Morrison.

The quantity of material handled in the Division of Insect Identification and Classification has again shown a conspicuous increase, amounting to nearly 60 percent over the fiscal year 1933. More identifications have been made this year in every order of insects than in past years, but the conspicuous jump has come in blood-sucking Diptera, due to our cooperation with the Army Medical Museum in a survey of the mosquitoes found in the Civilian Conservation Corps camps. Some 12,000 identifications have been made in this connection and in connection with the Bureau of Entomology's mosquito survey in the Chesapeake Bay area. Despite this increase in identification work, specialists on the staff have succeeded in completing, and in some cases publishing, a number of technical papers on their groups, and definite progress has been made by them in the further organization of the reference collections which they use in making identifications.

INSECT PHYSIOLOGY AND TOXICOLOGY

The work in this Division is under the direction of F. L. Campbell.

INSECTICIDES DERIVED FROM PLANTS

ROTENONE-BEARING PLANTS

Tests against house flies of kerosene extracts of roots of derris, cubé, *Cracca virginiana*, and of haiari stems led to the following conclusions: Rotenone is not the only toxic component of kerosene extracts of rotenone-bearing plants, but it appears to be an important one. A given weight of derris root is likely to yield a larger volume of effective kerosene extract than the same weight of pyrethrum flowers. Pyrethrum extracts are more effective in paralyzing flies, derris extracts more effective in killing them. Kerosene extracts of the samples of *Cracca* at hand were not promising as compared with those of derris and cubé.

Both kerosene extracts and acetone extracts of rotenone-bearing plants were tested to find out the relation between chemical composition of the roots and effectiveness of the extracts against house flies. It was found that rotenone content is usually a good index of insecticidal value, but samples of derris occur

whose extracts are more effective than their rotenone content indicates. The value of these aberrant samples is indicated by the percentage of total acetone extractives or methoxyl content. In the samples of derris and cubé so far studied, effectiveness is correlated on the whole better with methoxyl content than with any other single chemical determination.

In the course of the investigations just mentioned, a rapid method was developed for testing liquid insecticides against house flies. This method is so much faster than the Peet-Grady method now used in commercial laboratories that the household insecticide industry is likely to adopt it.

TOBACCO AND NICOTINE

At the request and with the assistance of the Tobacco Section of the Agricultural Adjustment Administration, experiments were made on the insecticidal value of nicotine in new or untried combinations. Most of this work was done during the winter at Sanford, Fla. Preparations containing nicotine in relatively insoluble form were tested in the laboratory against five species of caterpillars that are pests of truck crops. The purpose of the work was to find out whether any so-called fixed nicotine preparation offers promise of replacing arsenicals for the control of certain truck-crop pests.

The results were not encouraging but facts of considerable interest were brought to light. The five species of caterpillars differed greatly in their susceptibility to fixed nicotine preparations. The greenhouse leaf tier was so resistant that the materials tested would have no practical value against it. The diamondback cabbage worm on the other hand was very susceptible, at least in the first instar. It is doubtful whether any of the materials tested would be effective against mature larvae. In the first instar, the green cutworm (*Lycophotia infecta* Ochs.) was very susceptible whereas another cutworm, the southern armyworm, was resistant. It is possible that cabbage worms could be controlled by fixed nicotine preparations of the nicotine-bentonite type, but present indications are that derris and pyrethrum dusts would be more effective for this purpose. It was surprising to find that nicotine silicotungstate, a compound so insoluble that it is used for the gravimetric determination of nicotine, was, on the whole, the most effective of the materials tested. It was the only nicotine compound that was effective against the southern armyworm and it is suspected that its effect was due more to the silicotungstate radical than to nicotine.

In laboratory tests against mosquito larvae, nicotine was found to be more effective in dilute solutions of sodium bicarbonate than in water. A tobacco extract containing in addition to nicotine other substances extractable from tobacco was no more effective than solutions of nicotine of the same concentration.

MISCELLANEOUS TESTS

Many samples of plant extracts and synthetic organic compounds were tested against mosquito larvae and other insects for the purpose of finding highly toxic materials that might be worthy of further study as stomach-poison insecticides. Nothing of importance has appeared in the tests of plant extracts but progress was made in the synthetic organic compounds. The most toxic compound so far found in tests against culicine mosquito larvae is phenothiazine or thiodiphenylamine. This compound is effective against the larvae at a dilution of 1 part per million in water. No striking results have yet been obtained with it in tests against other insects. All derivatives and substitution products of phenothiazine so far made are less toxic to mosquito larvae than phenothiazine itself. The sulphur in the molecule of this and of other organic compounds appears to play an important part in their toxicity.

TRUCK CROP AND GARDEN INSECTS

The work in this division is under the direction of W. H. White.

WIREWORMS

Investigations on wireworms have been continued in Washington, Idaho, California, South Carolina, and Alabama. Work along control lines has consisted mainly of fumigation with naphthalene, trapping adults, flooding, drying-out of the soil, and crop rotation.

Further observations on the sand-land wireworm control experiments show that the starvation method, which last season indicated would be of value, has not proven successful.

BEAN AND PEA INSECTS

The Mexican bean beetle continues to be the most important pest of beans in the United States, and while its winter survival was slightly less than that of last season, the pest caused considerable damage in certain areas. Both field and laboratory tests of insecticides against this pest have been continued in Ohio, Virginia, and New Mexico.

The tachinid parasite which was introduced from Mexico in 1930 and which has been bred through the winter under laboratory conditions was again liberated in several areas, but so far has not been recovered in the field. The indications are that this parasite will not survive the winter in this country without an alternate host.

The pea aphid investigations were continued in Wisconsin. Owing to the unprecedented weather conditions, the pea aphid not only caused considerable damage in the northern pea-growing areas, but was especially abundant in the pea-growing areas of the Northwest.

BEET LEAF HOPPER

Investigations on the beet leaf hopper were continued in Utah, Idaho, Colorado, and California. The pest caused severe injury to the beet crop in all of the intermountain areas. From early-season indications the prospects were for low leaf hopper populations in the Idaho beet-growing area. However, unexpected numbers of the leaf hopper migrated into the cultivated area, which resulted in the abandonment of a considerable portion of the acreage that had been planted. This influx of the leaf hopper was not due to a development of the pest in the areas which had heretofore been considered as important as contributing to the leaf hopper populations in the beet-growing areas, but to a migration from an unknown distant breeding area. As expected, the leaf hopper was abundant in the Grand Valley and southern Utah. In California the spraying and elimination of the host plants program which was carried on in the San Joaquin Valley apparently reduced leaf hopper damage, as the mild and dry winter experienced would have permitted the large overwintering leaf hopper populations to build up in exceptionally destructive numbers.

SWEETPOTATO WEEVIL

The sweetpotato weevil control project which has been conducted in cooperation with the States of Mississippi, Alabama, Louisiana, Georgia, and Florida since 1918 was discontinued on June 30, 1934. It has been thoroughly demonstrated that crop rotation, the use of certified or uninfested planting stock, the culling of seed potatoes, cleaning up of the fields at harvest, and cleaning up of old storage banks will not only reduce weevil infestations but, if followed systematically, will eradicate the pest from any given farm. The cleaning up of the seaside morning-glories, the wild host plant of the sweetpotato weevil, in the Gulf region and on the islands off the coast of Georgia which was carried on last winter under Civil Works Administration funds will aid materially in the protection of the sweetpotato crop.

TOBACCO INSECTS

The studies on the control of tobacco pests affecting the field crop have been continued in Clarksville, Tenn., and Quincy, Fla. Substitutes for lead arsenate for the control of the tobacco hornworm have been tested, but as yet no satisfactory material has been found.

BERRY INSECTS

The work on berry pests has been carried on principally at the Puyallup, Wash., laboratory against the raspberry fruitworm. Extensive tests with several materials corroborate last season's results in that early applications are more effective in preventing bud damage but that later applications of an insecticide are necessary to reduce fruit infestation.

ARSENICAL-SUBSTITUTE STUDIES

Studies on arsenical substitutes and means of eliminating harmful residues from the market product have been continued at Alhambra, Calif., Baton Rouge, La., Chadbourn, N.C., Charleston, S.C., Columbus, Ohio, and Sanford, Fla. These experiments, which have been mainly with cabbage, substantiated the results obtained last season that treatments with arsenicals or other similar materials

may be continued on this crop up to within 40 days of harvest time without danger of any harmful residue remaining on the market product and also if the cabbage is not treated after the plants begin to form heads. Practically all leaves which develop prior to the time that the marketable head begins to form are discarded at the time of harvest.

Additional tests against the celery leaf tier have shown rather definitely that rotenone compounds are not effective against this insect, and pyrethrum is apparently a specific poison for the pest.

Damage by the pepper weevil has been materially reduced in several areas by the cleaning up of nightshade, the important winter host plant of the weevil. No safe insecticidal treatment has been developed for this pest.

Melon and pickle worm control studies on fall-grown squash have been continued at Charleston, S.C.

GREENHOUSE AND BULB INSECTS

Studies on insects affecting ornamentals and bulbs have been continued at Babylon, Long Island, N.Y., Sumner, Wash., and Washington, D.C. One of the outstanding features from a study of the *Tarsonemus* mites is the fact that it has been definitely established that eight new species of mites are associated with the broad mite and cyclamen mite where formerly only the latter was recognized as a plant pest. While investigations to date indicate that certain of these forms are saprozoic and that their presence on the crop will not necessarily result in primary plant injury, recognition of these species will have a fundamental value in determining the results of control measures against the cyclamen and broad mites.

GLADIOLUS THRIPS

The gladiolus thrips is now widely spread over the country, and where control measures are not practiced, it is causing considerable damage.

MUSHROOM INSECTS

Under this project an apparatus has been developed for the burning of sulphur as a means of destroying insect life in the house prior to the time that the spawn is placed in the bed. This burner operates from the outside of the house and the sulphur dioxide is forced into the house by the means of a centrifugal fan. This burner will eliminate the present cumbersome method of burning sulphur in pans placed in the walks within the house and will also reduce the fire hazard.

PLANT DISEASE ERADICATION

The work in this division was under the direction of the late K. F. Kellerman.

BARBERRY ERADICATION (PREVENTION OF BLACK STEM RUST)

During the past year 563,000 barberry bushes were eradicated on 4,900 properties in the 13 North Central States comprising the barberry-eradication area. Beginning in 1918, Federal and State agencies have eradicated more than 19,000,000 barberry bushes. The result has been a decrease in the annual loss of wheat due to stem rust from an average of more than 57,000,000 bushels for the 5-year period 1916-20 to less than 10,000,000 bushels for the period 1926-30. The number of bushes destroyed by Federal and State agencies during the fiscal year 1933-34 is more than double that of the previous year. The increased activity was made possible by an allotment of funds from the Public Works Administration to the Department of Agriculture for expansion of the stem-rust-control program.

For convenience, activities involved in the stem-rust-control program may be divided as follows: (1) Field observations on rust conducted for the purpose of determining the source, prevalence, and severity of stem rust. The accumulated information serves as a guide to the localities where the most effective use of funds available for barberry eradication can be made. (2) Survey and eradication, which involves locating and destroying bushes in areas where they are growing in such concentration that the efforts of individual property owners are not sufficient to bring about the desired control. (3) Informational activities intended to bring about a better-informed public which will gradually assume more of the responsibility for eradicating bushes that may develop from seed after the original bushes are destroyed.

The following tabulation indicates the trend that wheat losses in bushels resulting from stem rust have taken since the eradication program began. The average annual loss by 5-year periods is as follows: 1916-20, 57,704,000; 1921-25, 17,867,000; 1926-30, 9,641,000; 1931-33, 2,822,000.

SURVEY AND ERADICATION

After 16 years of continuous effort in barberry eradication, remaining bushes are few and scattered in most of the cooperating States west of the Mississippi River. However, in Iowa, Minnesota, Wisconsin, Illinois, Ohio, and Michigan, there are remaining many areas in which common barberries are numerous along rivers and on rough pasture and other uncultivated lands. It is in territory of this kind that the local labor crews have proven most valuable.

Because of the regional nature of the stem-rust-control problem, it is important to this western territory to eradicate barberry bushes in the States immediately to the east. Once rust gains a start near barberries the disease may spread for miles while the grain is still in a succulent stage. During seasons when the weather is favorable for rapid development of the fungus a few barberry bushes in one locality may be responsible for severe rust damage throughout an entire grain-growing area. Thus eradication in any given community or even in any one State has a double purpose: (1) It reduces the amount of local rust inoculum and the resulting damage to grains, and (2) it prevents widespread and destructive epidemics of the disease developing as the result of many small rust spreads coalescing.

Table 2 shows the number of properties cleared and barberry bushes eradicated during the fiscal year 1933-34, and the entire campaign, 1918-34.

TABLE 2.—*Data on barberry-bush eradication in various States*

State	Fiscal year 1933-34		Entire campaign 1918-34	
	Properties	Bushes	Properties	Bushes
	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>
Colorado.....	27	5,351	2,034	60,206
Illinois.....	515	26,981	16,720	2,672,299
Indiana.....	180	5,156	5,787	267,425
Iowa.....	567	33,168	12,113	1,172,678
Michigan.....	647	120,534	12,829	5,926,412
Minnesota.....	528	19,822	6,554	946,310
Montana.....	23	446	464	41,572
Nebraska.....	92	1,793	4,434	144,358
North Dakota.....	10	302	990	30,540
Ohio.....	779	256,253	13,639	2,613,070
South Dakota.....	42	348	1,419	134,840
Wisconsin.....	1,520	92,822	12,999	5,297,462
Wyoming.....	9	244	117	5,424
Total.....	4,939	563,220	90,099	19,312,596

In cooperation with the Bureau of Plant Quarantine, nurseries propagating and shipping barberries into and between the States of the barberry-eradication area are inspected and shipping permits granted those growing only species of *Berberis* resistant to the stem rust fungus.

DUTCH-ELM-DISEASE ERADICATION

During the summer of 1933 an outbreak of the Dutch elm disease was discovered in adjacent portions of New Jersey, New York, and Connecticut, with the center in the vicinity of New York Harbor. According to the best information now available, the disease was introduced in this area direct from Europe within the past few years.

As a result of scouting in the outbreak area during the past fall and winter about 1,500 diseased trees were found scattered over some 1,400 square miles with decreasing intensity outward from the center. An unexpectedly rapid development of the disease took place at the beginning of the growing season in 1934 as a result of overwintering incipient infections which develop rapidly in the new current season's sapwood and which had not developed sufficiently evi-

dent symptoms to be readily detected during this winter-work program. The infected trees began to show serious wilting by May 20 and within a month many of them were dead or dying. During the fiscal year there were found a total of 3,255 such trees in the infected States as follows: New Jersey, 2,012; New York, 1,235; and Connecticut, 8.

Men employed under C.W.A. projects, which supplemented the scouting and eradication activities in the outbreak area during the past winter, assisted in locating and removing the 1,500 diseased trees that could be diagnosed in the dormant season. However, the rapid development of the disease this spring from obscure overwintering infections has made it impossible to perform timely eradication of all of the trees found with the limited funds available to the Bureau and cooperating States. New infections of the current season had not become evident by the end of the fiscal year though it is felt certain that a considerable number of such cases will develop.

The disease has been located at three other points in this country, namely, at Cleveland and Cincinnati, Ohio, in 1930, and at Baltimore, Md., in 1933, and prompt location and eradication of the diseased trees appear to have prevented spread.

PHONY PEACH ERADICATION

The phony peach disease is considered the greatest single menace to successful peach production in the Southeastern States, and is a potential threat to the industry of the entire country. The only known method for dealing with the disease has been found, the destruction of affected trees. In order to meet this situation, a cooperative Federal and State campaign for the eradication of this disease was undertaken, commencing in the spring of 1929. This campaign has now been carried on for 5 successive years, with encouraging results, in view of the fact that it has heretofore been necessary to confine the work almost entirely to the inspection of commercial plantings.

During the 1933 season (fiscal year 1934) regular inspection work was carried out in Alabama, Georgia, Louisiana, Mississippi, and Texas. Out of a total of 1,202 commercial orchards inspected, containing 5,428,498 trees, 761 orchards were found infected, and 31,914 phony trees were found in these commercial orchards. In home orchards, during the same period, 1,949 observations were made; 1,163 of these orchards were found diseased, with 4,640 phony trees. During the 1933 inspection season the total numbers of infected trees found were as follows:

	<i>Trees</i>		<i>Trees</i>
Alabama.....	481	Mississippi.....	350
Georgia.....	33, 249	Texas.....	1, 148
Louisiana.....	1, 326		
		Total.....	36, 554

In central Georgia and Alabama, where the phony peach disease had been gradually spreading and becoming more destructive to commercial peach growing for a considerable period, the disease was becoming established in the wild trees of the region, and in these scattered and unnoticed wild trees, as well as in abandoned orchards, it was building up an increasing reservoir of regional infection. A Civil Works phony-peach-eradication project was undertaken in December 1933 to develop winter work to meet this emergency by clearing out of these heavily infected counties all wild or abandoned peach trees likely to be centers of infection of the phony peach disease. This work was continued as a Federal project until February 15, 1934, and in view of the strong local support of the Federal Civil Works project to eradicate the phony peach disease, these activities were continued as State Civil Works projects until March 29, 1934. The work was carried on in 42 counties in Georgia and 3 in Alabama. Trees were removed as shown in table 3.

TABLE 3.—*Peach and plum trees removed in phony-peach-eradication campaign*

Kind of trees	Georgia	Alabama	Total
	<i>Number</i>	<i>Number</i>	<i>Number</i>
Abandoned.....	942, 380	136, 671	1, 079, 051
Wild peach.....	2, 765, 530	336, 203	3, 101, 733
Wild plum.....	540, 892	2, 983	543, 875
Total.....	4, 248, 802	475, 857	4, 724, 659

BLISTER RUST CONTROL

Control of the white pine blister rust in the several important white pine regions of the country made satisfactory progress during the past year. This was especially true in the western white pine region of northeastern Washington, northern Idaho, and northwestern Montana where the rust situation is more acute due to the rapid spread and intensification of the disease. In this region the area brought under control almost equalled the total area previously worked. In the country as a whole about 1,045,661 acres of pine-producing land was protected by the eradication of 68,972,384 wild currant and gooseberry bushes, the alternate host plants, which spread the rust to the pines. This work was carried on in cooperation with 31 States and with Federal agencies responsible for the administration of public lands.

The spread of the rust was marked by two important extensions of the known infected area. In the East, the southern limit of pine infection was extended from northwestern Maryland to Augusta County, Va. Diseased pines were located at four points and infection appears to have occurred as early as 1924. In the West, *Ribes* (currant and gooseberry plants) infection was found in Oregon in 12 new locations, 3 of which were in eastern Grant County and represent an eastward extension of the rust. Pine infection was located at 3 points, 1 in Marion County and 2 in Lane County. The infection at Bohemia Mountain in southeastern Lane County represents a southerly extension of the known limits of pine infection and is about 100 miles north of California.

The regular control work of the Bureau was expanded considerably as a result of the allotment of Public Works funds and the use of labor made available by the C.C.C. and the C.W.A.

In the Western States there are two extensive forest regions where the white pines are of great economic and commercial importance, the western white pine region of northeastern Washington, northern Idaho, and northwestern Montana and the sugar pine region of southern Oregon and California. Blister rust is established and rapidly intensifying each year in the western white pine region as indicated by this year's discovery of 13 new pine-infection centers. This brings the total known centers to 90 at the end of 1933. All of them have developed within the last 11 years and there are undoubtedly many others still undiscovered. Control efforts are centered on establishing and maintaining control of the diseases on an area of 3,000,000 acres containing the best of the white pine land and timber. About half of this area is in public ownership. In 1933, approximately 214,976 acres were cleared of *Ribes*, bringing the total protected area to 436,032 acres. It is expected that this area will be increased to over 1,000,000 acres during the current season.

The situation in the sugar pine region is of less immediate urgency but control work if continued would act as a preventive measure to decrease the losses that may be expected once the disease becomes generally established in this region.

The general situation with respect to the control of this disease in the eastern States is quite favorable. In the northeastern region 101,701,527 disease-spreading *Ribes* bushes have been destroyed since 1918 on 9,026,727 acres of land or 76 percent of the control area needing protection. This work has effectively checked the intensification of the rust and the damage to white pines on control areas. A total of 1,150,815 acres or about 10 percent of the control area has been reworked to keep the disease under control and derive full benefit from the work already done.

In the Appalachian region a comparatively narrow belt of white pine extends from Pennsylvania to Georgia along the Appalachian Mountains. The rust is spreading gradually and pine infection is known to occur as far south as Augusta County, Va. *Ribes* in general are more localized and less numerous in this region so that a small amount of timely work should keep the white pine area relatively free of the rust and make it safe for the growing of white pine as a timber crop.

The Lake States region originally contained one of the most extensive and finest virgin white pine forests in the country. There now remain numerous scattered areas of second-growth pine aggregating several hundred thousand acres and in addition white pine is being extensively used in the reforestation of large areas that were severely burned following logging. Blister rust is generally distributed and *Ribes* are present in harmful numbers in white pine stands and on planting sites. Control work has been conducted on such a limited scale in this region that only a relatively small portion of the pine area has been protected.

CITRUS CANKER ERADICATION

Continued observations during the past year in Florida and Alabama, where no citrus canker has been found since 1927, and in Mississippi, where none has been found since 1922, failed to show any infections, indicating that these States have remained canker-free as a result of the effective cooperative eradication campaign carried on since 1915.

In Louisiana and Texas, the disease is persisting at a number of points outside of the commercial districts. In these areas the work is complicated by many scattered dooryard trees, abandoned plantings, and thickets of escaped *Citrus trifoliata* in obscure places, which make complete inspection slow and difficult and give rise to sporadic outbreaks of the disease. Encouraging progress was made in searching out and eradicating these outbreaks, but several years' additional work will probably be necessary before the complete eradication of the disease from the continent can be effected.

Because of scattered infections being found in Texas, a Civil Works project was undertaken in December, 1933, to remove abandoned *Citrus trifoliata*. This was continued as a Federal project until February 15, 1934, and as a State or local project until March 29, 1934. Work was done in 22 counties of the Gulf Coast area; 199,866, or about 85 percent, of the *C. trifoliata* trees in the counties were destroyed. The remainder have been definitely located and plans are being made for their destruction later.

FRUIT AND SHADE-TREE INSECTS

APPLE INSECTS

Last year's report of this Bureau outlined in considerable detail the problem of spray residue and the control of the codling moth (*Carpocapsa pomonella* L.) and pointed out certain of the difficulties involved in working out a satisfactory solution to the problem. Because of the urgency of the situation, the apple-insect allotment has been slightly increased in the face of general reductions in funds. The work has been continued in the field stations at Takoma Park, Md., Vincennes, Ind., Yakima, Wash., and Wenatchee, Wash. In the interest of efficiency the station which was maintained for a number of years at Bentonville, Ark., was consolidated with the station at Vincennes, Ind., in the early winter of 1934.

In the effort to work out a solution of this difficult codling moth problem, a grant of P.W.A. funds in the amount of \$103,215 was made in the spring of 1934.

Approximately half of this allotment has been utilized in conducting three regional large-scale field experiments with various organic materials, such as pyrethrum, derris, and nicotine, in various combinations as possible substitutes for lead arsenate. This work has been located at Parma, Idaho, St. Joseph, Mo., and Kearneysville, W.Va., in cooperation with the agricultural experiment stations of the respective States. In Idaho and West Virginia, the State experiment stations have loaned workers to take immediate charge of the work, and have furnished quarters at substations maintained at the points where the experimental work is under way. For these experiments 20 to 25 acres of orchard in each locality have been leased outright. Experiments with organic insecticides are also being conducted at Hood River and Talent, Oreg. Supplementing the large-scale field experiments, intensive laboratory testing of various organic materials is under way at the regular stations at Takoma Park, Md., and Vincennes, Ind.

In addition, experiments are being conducted on banding and orchard sanitation, in order to obtain more definite information on the exact value of the various so-called supplementary practices, and with the control of the codling moth by the use of the egg parasite *Trichogramma*, which gave favorable indications in preliminary tests at Cornelia, Ga., last season. Large-scale field experiments with bait traps and light traps have also been set up at Orleans, Ind., in cooperation with the Indiana Agricultural Experiment Station. Work with light traps has also been undertaken at Geneva, N.Y., in cooperation with the New York Agricultural Experiment Station. A little attention has also been given to the effect of the various materials on bees, which are an important factor in the pollination of apples.

Observations in the experimental orchards have indicated that a fully adequate solution of the problem will not result from the single season's work, although a great deal of information will be obtained which will be a valuable basis for investigations in subsequent seasons.

PEACH INSECTS

The work of colonizing effective parasites of the oriental fruit moth (*Grapholitha molesta* Busck) is being continued with headquarters at the Moorestown, N.J., laboratory although on a somewhat reduced scale. Apparently as a direct result of the efforts of the Bureau in distributing it, *Macrocentrus ancylivorus* Rohwer is now the most abundant and effective parasite. In many important districts it is the dominant species, almost always being associated with a pronounced reduction in fruit infestation. The plans for the 1934 season include the rearing and propagation of several additional species of parasites from Japan and their colonization in important peach areas, and the making of recovery collections to determine the outcome of previous parasite liberations.

The investigations of bait traps for the control of the fruit moth have been continued at Cornelia, Ga., on a much reduced scale. Further comparisons are being made of various bait materials, and additional practical tests are being made of the better baits in commercial orchards. To the detriment of the experiments, the infestation has turned out to be very light during the 1934 season.

Tests have been made at the Fort Valley, Ga., laboratory of various methods of freeing peach nursery stock from infestation by the peach borer (*Aegeria exitiosa* Say) because of the possible part played by this insect in the dissemination of the phony disease of peach.

GRAPE INSECTS

The work on grape insects has continued as hitherto. Practically the entire attention of the station located at Sandusky, Ohio, has been given to a study of the grape berry moth (*Polychrosis viteana* Clem.), in an effort to develop effective means of control not involving poisonous spray residue at harvest time.

In order to strengthen the work on the grape insects, \$6,000 of the P.W.A. funds granted for spray-residue investigations has been allotted to grape-insect work for an expansion of the 1934 season's program.

NUT INSECTS

The entire nut-insect allotment is now being devoted to a study of insects attacking pecans. The work is conducted at stations at Albany, Ga., Shreveport, La., and Brownwood, Tex. Their activities, however, have been somewhat curtailed. The work of the Georgia Experiment Station, which was making a special study of the pecan weevil (*Curculio caryae* Horn), was discontinued November 30, 1933.

Following the inconclusive results of the 1933 season in the use of the egg parasite *Trichogramma* in controlling the nut casebearer and other pecan insects, a special study is being made at Albany of the behavior of the different strains of the egg parasite, to determine the suitability of these different strains in the control of different pests. With additional funds furnished by other projects, the Albany station has supplied other units in the Bureau with stocks of *Trichogramma* for experiments in the control of other insect pests.

SUBTROPICAL FRUIT INSECTS

The Whittier, Calif., laboratory has continued the intensive accumulation of detailed data necessary as a basis for an understanding of the resistance of the red scale (*Chrysomphalus aurantii* Maskell) to fumigation with hydrocyanic acid gas. Unfortunately, this work has recently been handicapped by the withdrawal of the Bureau of Chemistry and Soils from the project, this action being made necessary by reduction in funds.

Confirming results previously obtained in central California in the control of the citrus thrips (*Scirtothrips citri* Moulton), the first season's experiments in southern California have given very satisfactory control of this species in districts in which untreated groves suffered to the extent of 30 to 60 percent damage.

Investigations of the red date scale (*Phoenicococcus marlatti* Ckll.), the date mite (*Paratetranychus heteronychus* Ewing), and other date pests in the Coachella Valley are expected to be completed at the close of the 1934 season, and manuscripts covering this work are being prepared.

The control of the citrus rust mite (*Phyllocoptes oleivorus* Ashm.) has continued to receive attention at the Orlando, Fla., laboratory.

FRUIT FLIES

The work on the Mexican fruit fly in the laboratory in Mexico City has developed in close cooperation with the Mexican officials who have established a control zone south of the United States citrus area in the Rio Grande Valley. Methods of possible value in such a zone are being investigated jointly. Studies have shown that larvae developing in different fruits resist treatment differently, a fact indicating the desirability of wide study before recommendation. Work with baits has proven that proteins decomposed by strong alkali, or by suitable micro-organisms, give products especially attractive to the guava fruit fly, a lead that may be useful with other insects. A preliminary study of sources and toxicity of *Haplophyton*, a native Mexican plant toxic to the fruit fly, has been made. If the plant could be produced in quantity without variation in its toxic action, it might serve as a useful insecticide source.

At the Honolulu, Hawaii, laboratory, investigations have been continued on the life history, habits, and means for controlling the Mediterranean fruit fly. Much of the work carried on during the last few years has been summarized and technical papers reporting on the results of experiments have been prepared for publication.

Special attention was directed to the summarizing of the extensive studies to determine the effect of high and low temperatures on the immature stages of the fruit fly. Results of these experiments all fully substantiate work previously done and demonstrate that when all types of fruit available in Hawaii or those introduced and infested for experimental purposes are treated so that an inside fruit temperature of 30 to 31° F. is maintained for a period of 15 days, eggs, larvae, and other immature stages of the fruit fly will be killed.

Experiments indicate that the length of exposure necessary to secure mortality varies as much as 72 hours, depending on the composition of the fruit. Experiments to determine the period necessary to hold fruits under refrigeration at somewhat higher temperatures are being continued. Similarly additional experiments to fill in the gaps to determine the period of exposure at temperatures ranging from 107 to 115° F. are planned for the coming season.

Considerable progress has been made in the experiments to develop better attractants with particular attention being devoted to ammonia and protein. In the tests to determine the value of poisons combined with various types of sweetened materials applied to the foliage as sprays, special attention has been devoted to tartar emetic, potassium antimony tartrate, to determine not only its effectiveness on the flies but also its effect on the foliage. Practical tests conducted in mango and citrus orchards confirm the indications from previous work that even under conditions of general infestation which exist in Hawaii, considerable protection can be obtained by repeated applications of such a spray.

The Canal Zone fruit fly laboratory has continued to accumulate data on the biology, habits, and host-fruit preferences of the numerous species of fruit flies present in that area. Some of these species have been practically unknown to science, and the information obtained about them will be of great value in the event any of them should accidentally reach the fruit-producing areas of southern United States.

Mention was made in last year's report of the special studies being conducted at Key West in connection with the efforts made by the Florida State Plant Board to eradicate two species of West Indian fruit flies from the island of Key West, in order to prevent their establishment on the mainland. These fruit flies are now known as *Anastrepha acidusa* Walk. and *A. suspensa* Loew. The results of oviposition experiments indicated that the species *A. acidusa* may successfully attack, under cage conditions, 35 different fruits, including grapefruit, and that the species *A. suspensa* may also attack many of the same fruits. Results of insecticide tests have confirmed the superior merits of tartar emetic as a poison for a bait spray for these two species of fruit flies.

Because of the eradication program, these fruit flies have nearly disappeared from Key West. The work was, therefore, transferred in January 1934 to Puerto Rico, where both fruit flies occur. Further studies are now under way in the laboratory and in the field to determine the host-fruit preferences and habits of the species, and to develop more effective methods of control. The results thus far have continued to indicate that tartar emetic is the best poison for use in fruit-fly baits. Field infestation of *A. suspensa* has been found in citrus fruits in Puerto Rico.

STORED PRODUCT AND HOUSEHOLD INSECT INVESTIGATIONS

The work in this division was under the direction of E. A. Back.

FLOUR-MILL AND GRAIN INSECTS

During the past year the headquarters for these investigations were moved from Kansas City, Mo., to Manhattan, Kans. The cooperation with milling companies has been continued and many checks on practical large-scale fumigations have been made to the advantage of all. Of special interest and value have been the experiments tending to prove the practicability of introducing the fumigant to the machinery itself rather than to the mill spaces from which penetration of the equipment takes place. Experiments have demonstrated that this newer type of fumigation, which can be made without the closing down of the mill in a busy season, may not be quite so effective in the total number of insects killed, but thoroughly practical from the standpoint of preventing clogging of machinery and forced shut-downs for removing the insect-webbed flour, and very much cheaper. Probably 95 percent of all fumigations conducted in flour mills, except those exporting flour, are for the purpose of preventing the Mediterranean flour moth from webbing the flour to the point of forcing the stoppage of operations.

INSECTS AFFECTING DRIED FRUITS

These investigations conducted at Fresno, Calif., have continued to enjoy the hearty cooperation of the California Dried Fruit Association. The results of the work during the past year were considered of such value to the industry that they were published at the expense of the association for distribution to its membership. Of special interest and of practical value is the work conducted in drying yards on the ranches with shields of cheesecloth housed over the fruit during the drying and ranch-storing periods. Done at little cost per ton, the exclusion of egg-laying moths has resulted in making it possible for ranchers to deliver at the processing plant a product that grades high, thus saving to the rancher the cash deductions which now are made with the lowering of grade due to insect presence.

The fumigation of raisins, peaches, apricots, etc., in the stacked trays, etc., on the ranch, under light movable fumigatoria as well as in special fumigating houses, has yielded practical results. Probably no food industry has shown such a pronounced forward step in savings from insect attack on the farm as that made possible on the dried-fruit ranches due to the investigational work of the Department.

THE PEA WEEVIL

The pea weevil has continued as a serious pest in the Northwest, but a survey conducted during the past year in the eastern districts indicates that it is not present there in such destructive numbers. In the Palouse area investigations on control on farms have been very gratifying from the practical aspects. The heavy concentration of hibernating weevils upon the bloom of plants in the border strips planted 3 or 4 weeks before the main crop, discovered and reported upon last year, pointed to the possibility of turning this habit of the weevil into a vulnerable feature of its life cycle. During the past season border crops heavily infested were plowed under to a depth of 8 to 9 inches and then harrowed and cultipacked three times. Cage examinations proved that only 1.7 percent of the original weevil population succeeded in surviving this treatment.

INSECTS ATTACKING CURED TOBACCO

This work, with headquarters at Richmond, Va., has been enlarged during the past year to cope with the problems of the cured-tobacco industry of the Northeast and Middle West, as well as those of the Bright Tobacco Belt, thus unifying the service in a way very gratifying to the members of the Tobacco Association of America.

A representative of the Bureau spent several months investigating the tobacco-storage conditions in the eastern Mediterranean tobacco areas, especially Greece and Turkey, in which Americans have large investments in tobacco, and from which much tobacco of a type not grown in the United States is imported. These imported tobaccos have carried heavy infestations of tobacco pests and the purpose of the trip was to study the storage conditions favorable to insect increase and to institute control measures developed by the Department with a view to

safeguarding American-grown tobacco in our warehouses from contamination from imported tobacco. A study of storage conditions was also made at points in Italy, France, and England.

The perfection and growth in use of light traps in tobacco storage has been an important feature of the past year. The Department's discovery that tremendous numbers of tobacco beetles can be lured and killed in light traps has become popular with the tobacco-storage warehousemen. The initiation of routine vacuum fumigation of all tobacco going into storage has been another of the outstanding developments of the past year. Vacuum fumigation is especially adapted to treatment of baled imported tobacco.

HOUSEHOLD INSECTS

The work with household insects has been confined during the past year largely to continued investigations into the value of fumigable storage for furs and clothing and to moth-proofing solutions. The former work, which has been reported upon previously, has resulted to date in the installation of much control equipment in storage warehouses and department stores. It is believed that the basic investigational work of the Bureau of Entomology with fumigable storage, and of the Bureaus of Entomology and Chemistry and Soils with noninflammable and nonexplosive fumigants only reasonably toxic to man as he comes in contact with them in control work, has resulted annually in the development of a million-dollar business in protecting articles from the attack of fabric pests. This method, being cheap, has greatly broadened the type of clothing that can be protected profitably and has reacted to the benefit of citizens of average means.

REPORT OF THE CHIEF OF THE OFFICE OF EXPERIMENT STATIONS, 1934

UNITED STATES DEPARTMENT OF AGRICULTURE,
OFFICE OF EXPERIMENT STATIONS,
Washington, D.C., September 1, 1934.

SIR: I transmit herewith a report of the Office of Experiment Stations for the fiscal year ended June 30, 1934.

Respectfully,

JAMES T. JARDINE, *Chief.*

HON. HENRY A. WALLACE,
Secretary of Agriculture.

The Office of Experiment Stations, as required by law and executive authorization, administered the Federal funds provided by the Hatch, Adams, Purnell, and supplementary acts, for the State agricultural experiment stations and those in Alaska, Hawaii, and Puerto Rico, for the year ended June 30, 1934; administered the Federal stations in Hawaii and Puerto Rico; sought to coordinate the work of the Department of Agriculture with that of the experiment stations in every practicable way; and prepared and published the usual annual report on the work and expenditures of the stations as required by law.

The Federal appropriations administered amounted to \$4,439,130 (\$90,000 to each State, \$15,000 to Alaska, \$62,270 to Hawaii, and \$41,860 to Puerto Rico) out of a total of about \$14,775,000 available to the stations from all sources.

INSPECTION AND CERTIFICATION OF STATIONS

Representatives of the Office visited all of the experiment stations, except those in Alaska, Hawaii, and Puerto Rico, before the end of the fiscal year 1934, and inquired into the use being made of the Federal funds and the methods of accounting for them. As a result, the Office was prepared to certify to the Treasury Department on or before July 1, as required by law, whether the stations were entitled to receive the funds provided for them by the Federal acts during the ensuing year. All of the stations were so certified.

The compilation of Federal legislation, rulings, and regulations affecting the State agricultural experiment stations (Miscellaneous Publication 202) was thoroughly revised and brought up to date during the year. This publication contains important new matter, particularly recent legislation and rulings, and modifications of the classification of accounts, not included in previous compilations. It is designed to set forth as clearly and completely as possible the basic requirements which must guide the Office in administering Federal funds provided for the State experiment stations and the responsibilities of the stations in using and accounting for these funds.

STATION PROJECTS AND PROGRAMS

Proposed projects and programs set up by the stations for use of the Adams and Purnell funds and submitted to the Office for approval or disapproval, as required by executive ruling, were carefully examined and approved or disapproved, or amended, as the merits of each case seemed to warrant. Suggestions for modification and improvement of certain of the projects were made by specialists of the Office and other bureaus of the Department. A large number of helpful conferences regarding the projects were held with heads and specialists of other bureaus of the Department, thus bringing about a clearer understanding as to the ade-

quacy of the projects and the procedure to be followed and how they fit into the Department and station programs and may contribute to the solution of the larger and more urgent farm and farm-home problems.

During the year the Office examined 460 active Adams and 1,578 active Purnell projects, of which 64 Adams projects and 314 Purnell projects were new or revised. This is a considerably larger number of new and revised projects than it has been necessary to pass upon in previous years. It reflects the effort of the experiment stations to meet the emergencies arising in agriculture, and to adjust their programs to the solution of problems which have arisen during the adjustment period. This is particularly true of Purnell projects. Examples of broad undertakings of this character were the National Civil Works Administration survey on taxation and tax-delinquency and subsistence-farming studies in cooperation with Federal agencies. Incomplete reports indicate that about 650 staff members of the State stations undertook special assignments in connection with various emergency activities, thereby increasing the difficulty of adjusting the research programs to the problems and available personnel.

Not only the 460 Adams projects and the 1,578 Purnell projects, but some 4,000 projects supported by Hatch, State, and other funds were examined by the Office as to progress, outlook, cost, and possible improvement. These projects represented research into almost every phase of farming and rural living, including land use and conservation; crop adjustment; economical production, distribution, marketing, and use of plant and animal products; improvement of the quality of such products; protection against animal and plant diseases, insects, and other pests; betterment of the rural home and rural life; and tenancy, taxation, and other matters affecting the efficiency of farm-business management. There was special emphasis on efficient and quality production and on the economic and social aspects of rural life.

LISTS AND OUTLINES OF STATION PROJECTS

The Office undertook during the year to secure a complete and up-to-date list of all State station projects, whether supported by Federal funds or by State and other funds. As a result, a fairly complete list is now available, which will be corrected and kept as nearly up to date as practicable as a basis for planning new investigations, preventing unnecessary repetition and duplication, and coordinating Federal and State research.

The outlines of the Adams and Purnell projects were arranged in loose-leaf binders for consultation by specialists of the Office and bureaus of the Department. This was in furtherance of the request of the Secretary that various bureaus coordinate their research with investigations in progress at the experiment stations to avoid unnecessary duplication. The 2,000 projects supported by Adams and Purnell funds classified by major subjects were thus made readily available for examination. Supplementing this, an attempt was made to prepare a card catalog of all projects of the stations with such supplemental statements as seem necessary to clarify the type of work.

COORDINATION AND COOPERATION

The Chief of the Office and members of the staff, as well as other specialists of the Department, engaged in active efforts to plan and coordinate Department and station research and to use the resulting information in support of the adjustment and relief policies of the Government and to secure orderly and efficient dissemination of the information essential for this purpose. The Office acted as the intermediary in much of this work.

An interbureau committee on pastures and forage was appointed and a memorandum of understanding on the subject was drawn up with the Extension Service of the Department, and transmitted to the State experiment stations and extension services.

The question of unnecessary duplication sometimes charged against the Department and the State stations was further inquired into, with the result of showing few specific cases which could without qualification be called unwarranted duplication or repetition. There are, and of necessity must be, however, many examples of repetition and verification under varying environmental and economic conditions, as well as a large number of local and emergency services which might from superficial examination, appear to be unnecessary but which in reality are essential if the results of scientific research are to be fully established and usefully applied in practice.

The substantial progress being made in coordinating agricultural research is bringing about more effective local, regional, and Nation-wide teamwork on the larger and more urgent rural problems and policies. Of the 6,000 or more projects under investigation in agriculture and home economics in which the experiment stations were engaged during the past year, a large part was carried on in cooperation with the Department of Agriculture. The Office examined and recorded 685 new or revised cooperative agreements between bureaus of the Department and the experiment stations. All but 1 of the stations and all but 2 of the research bureaus of the Department had formal cooperative agreements of some kind, besides a large number of informal cooperative activities. Numerous cooperative undertakings organized on an emergency basis as parts of the national recovery program were participated in by practically all of the stations and Department bureaus.

Examples of coordination and cooperation on a large scale are attempts to organize a Nation-wide "back-to-grass" campaign and to aid the Tennessee Valley Authority to secure a regionally planned and developed agriculture based on knowledge and counsel of the Department and State agencies. Many others might be mentioned.

EXPERIMENT STATIONS IN ALASKA, HAWAII, AND PUERTO RICO

The status of the experiment stations in Alaska, Hawaii, and Puerto Rico supported by Federal funds remained practically unchanged during the year.

ALASKA STATION

The Alaska Experiment Station, under the immediate jurisdiction of the Alaska Agricultural College and School of Mines, received \$15,000 of Federal funds under extension of the Hatch Act to the Territory as provided for by an act of Congress of February 23, 1929.

The Office maintains much the same relation to the Alaska Station as to the State experiment stations. The station operates on budgets and projects approved by the Office, but has a large measure of freedom in choice of subjects for investigation and in use of funds under the terms of the Hatch Act. The work of the station is now confined primarily to the regions of Fairbanks, in the Tanana Valley, and of Matanuska, in the Matanuska Valley, and deals mainly with the possibilities of plant and animal production and dairying in these areas. G. W. Gasser continued as director of the station, with headquarters at College (near Fairbanks), Alaska.

A considerable demand for information regarding agricultural possibilities and suitable crops and cultural practices in Alaska was met in part by correspondence and distribution of publications from the Office. It is estimated that about 1,000 such inquiries were handled during the year.

HAWAII STATION

The Federal experiment station in Hawaii, associated with the University of Hawaii, at Honolulu, continued under the direction of J. M. Westgate. It had for the fiscal year 1934 a total income of \$86,270, as compared with \$94,500 for the previous year. The station had \$15,000 from the Hatch fund, \$11,000 from the Adams fund, \$36,270 from direct appropriation through the Department of Agriculture, and \$24,000 from territorial and university funds.

As in previous years, the work of the Federal station was directed mainly toward developing a more diversified and self-sustaining agriculture, leaving the problems of sugar and pineapple production, the leading agricultural industries of the island, largely to the well-organized research agencies supported by these industries.

Some significant features of the work of the station during the year were development of a simple rapid method of determining the fertilizer needs of different plants and soils based on the Mitscherlich principle; growth of grasses and legumes and other field and horticultural crops under tropical conditions; feeding value of cane molasses; housing, feeding, and management of poultry; using live virus to control sorehead of poultry; and study of the nutritive value of various Hawaiian food products.

PUERTO RICO STATION

There was little change during the year in the status and work of the experiment station, at Mayaguez, Puerto Rico, supported by a Federal appropriation of \$41,860, as compared with \$63,560 for the previous year. As in previous

years, this station continued to give major attention to development and introduction of improved sugarcane varieties, coffee fertilizing and cultural practices, control of animal parasites, and general service in aid of the establishment of a more self-sustaining agriculture in the island. The station continued under the direction of T. B. McClelland, who, however, severed his connection with the station at the end of the year.

Plans were further developed for the coordination of all agricultural research in Puerto Rico as provided for in the act of Congress of March 4, 1931, extending the benefits of the Hatch and supplementary acts under certain limitations to Puerto Rico. In the year beginning July 1, 1934, the Territorial station will receive \$25,000 of the Federal, Hatch, and Adams funds. The act of March 4, 1931, authorizes an increase annually to a total of \$90,000 in the fiscal year 1944. The plans for coordinating research of the Territorial and Federal stations can now go forward consistently with increase in the Federal payments to the Territory.

PUBLICATIONS

Publications of the Office designed to aid in carrying out the purposes of the Federal acts were continued as usual. Among the more important of these is, as it has been for many years, Experiment Station Record, which has become a comprehensive review of current literature and progress of research in agriculture and home economics and a medium for discussion of various timely matters bearing on such research.

EXPERIMENT STATION RECORD

Experiment Station Record under the editorship of H. L. Knight and with a staff including practically all the specialists in the Office, continued to function as an integral part of the activities of the Office in the promotion of research in agriculture and home economics, chiefly by its comprehensive review of the current literature along these lines. Continuing the policy of monthly issues averaging 150 pages each, volumes 69 and 70 were completed during the year. These volumes contain 3,474 and 3,292 abstracts, respectively, and in addition the customary editorials, news notes, and indexes.

H. P. Barss, formerly of the Oregon college and station, was added to the Record staff March 1, 1934, to have charge of the abstracting of scientific literature relating to plant physiology and pathology, which had been inadequately provided for since the retirement of W. H. Evans and W. E. Boyd in 1933. F. V. Rand, the Department representative of Biological Abstracts, was added to the staff under an arrangement materially enlarging the cooperative relations effective for several years. Under this arrangement, duplication of abstracts in botany and plant pathology for the two journals has been greatly reduced, and the abstracts made available to both in an economical and effective way. It is expected that the service of the Record in these special fields will thus be enlarged and strengthened.

Much assistance was given to institutions and individuals seeking to supplement the abstracts by more detailed information. This service frequently requires considerable time, but often makes available data not readily obtainable otherwise and therefore tends to economy of effort.

Assistance was also given an unusually large number of institutions in the replenishment of their files of back numbers of the Record destroyed by fire or otherwise incomplete. Advantage was taken of the opportunity afforded by shifts in the space allotted to the Office for the storage of reserve issues to rearrange and consolidate this stock on a more effective basis than ever before.

OTHER PUBLICATIONS SUPPLYING BASIC INFORMATION

In addition to Experiment Station Record, the Office prepared and disseminated, as usual, complete and up-to-date information regarding personnel, organization, facilities for research, progress and results of work, publications, and finances of the experiment stations.

A complete list of publications of the Office during the year follows:

Report of the Chief of the Office of Experiment Stations, 1933, by James T. Jardine; and Reports on the Agricultural Experiment Stations, 1932 and 1933, by J. T. Jardine, W. H. Beal, et al.

Miscellaneous Publication 180, Workers in Subjects Pertaining to Agriculture in State Agricultural Colleges and Experiment Stations, 1933-34, by M. A. Agnew.

Miscellaneous Publication 181, List of Bulletins of the Agricultural Experiment Stations for the Calendar Years 1931 and 1932, by C. E. Pennington.

Alaska Stations Circular 5, Feeding Dairy Cows in the Matanuska Region, Alaska, by W. T. White.

Report of the Hawaii Agricultural Experiment Station, 1933.
 Puerto Rico Station Bulletin 35, Sugar cane Variety P.O.J. 2878 in Puerto Rico, by R. L. Davis; and
 Report of the Puerto Rico Agricultural Experiment Station, 1933.

Publications in press or in course of preparation for printing by the Department at the close of the year included several numbers of Experiment Station Record; Miscellaneous Publication 202, Federal Legislation, Rulings, and Regulations Affecting the State Agricultural Experiment Stations (in press); Office of Experiment Stations (prepared for Miscellaneous Publication 88, The United States Department of Agriculture: Its Structure and Functions) (in press); Hawaii Station Bulletin 72, Napier Grass (*Pennisetum purpureum*): A Pasture and Green Fodder Crop in Hawaii, by C. P. Wilsie and M. Takahashi (in press); and Puerto Rico Station Bulletin 36, Parasites and Parasitic Diseases of Cattle in Puerto Rico, by H. L. Van Volkenberg (in press).

The following were edited for publication through the Hawaii Experiment Station: Bulletins 68, Japanese Foods Commonly Used in Hawaii, by C. D. Miller (printed in Hawaii); 69, Cane Molasses as a Supplement to Fattening Rations for Swine, by L. A. Henke (printed in Hawaii); Circulars 8, Fowl Pox (Sorehead) Control by Vaccination, by C. M. Bice (printed in Hawaii); 9, Propagation of Plants by Cuttings in Hawaii, by W. T. Pope (printed in Hawaii); The Nutritive Value of Green Immature Soybeans (Chemical Analyses and Vitamin Studies), by C. D. Miller and R. C. Robbins (prepared for publication in Journal of Agricultural Research); Natural Crossing in the Pigeon Pea (*Cajanus indicus* Spreng.), by C. P. Wilsie and M. Takahashi (prepared for publication in Journal of Agricultural Research); A Chemical Investigation of the Fermentations Occurring in the Process of Poi Manufacture, by L. N. Bilger and H. Y. Young (prepared for publication in Journal of Agricultural Research); and A Note on the Relationship Between the Chemical Composition of Soil Colloids and Two of Their Properties, by H. A. Wadsworth (approved for publication in Soil Science).

The preceding summary shows that the Office printed or prepared for publication during the year 36 documents aggregating approximately 3,400 pages.

LIBRARY AND BIBLIOGRAPHICAL SERVICE

The library of the Office, in charge of Cora L. Feldkamp, cooperating with the Department Library and the Extension Service, maintained, as in previous years, files of station, extension, Department, and other publications, which were circulated for the information of the Office staff and for review in Experiment Station Record, and were made available for consultation by the Department as a whole, and, as far as facilities would permit, by State institutions and others.

The main duty of the Office library is examination of books and periodicals for selection of such as appear to contain matter requiring review in Experiment Station Record. The library circulated to the Record staff for this purpose during the year 1,558 books and 27,472 periodicals. These were selected from approximately 10,000 books and 88,000 periodicals available for examination by the library staff, including about 1,000 station and 1,500 Department of Agriculture publications. Out of 29,000 or more books and articles called to their attention, the members of the Record staff selected approximately 6,800 for review in the Record.

Special bibliographical work of the library included a continuation of an index of articles contributed by the experiment stations to outside journals. This index shows that 1,373 such articles were contributed by the stations to journals during the year. In addition, 30 stations contributed or collaborated in 90 articles published in the Journal of Agricultural Research. The library continued to prepare monthly lists of experiment station publications, which were mimeographed and sent to librarians and others having special need for such lists.

By arrangement with the Department Library a list of articles published by the stations in outside journals is included each month in Agricultural Library Notes.

SPECIAL SERVICES

Calls for special services, such as conferences with representatives of the different bureaus of the Department and of other departments, and of the experiment stations and other State agencies; service on various committees within and without the Department; preparation of special reports, papers, and compilations of information relating to the organization and work of the Office and the experiment stations; and national, regional, and local problems of relief and

readjustment, always an important feature of the work of the Office, claimed an increased amount of time and attention during the year.

The Chief of the Office continued to serve on the committee on station organization and policy of the Association of Land-Grant Colleges and Universities, and assisted in preparing the committee's report, which dealt with adjustment of the station research programs to the new situation and reduced budgets, and the desirability of keeping before the public the value of agricultural research. He was also made a member of the joint committee on projects and correlation of research of the Department and the association. He presented a paper before the association entitled "To What Extent Is There Undesirable Duplication of Effort in Research?"

Within the Department the Chief served as a member of the interbureau committees on pasture and forage crops, cotton research, plant and animal improvement, and the study of factors affecting the grade and quality of hay and hay products (with H. W. Marston).

DISTRIBUTION OF STATION PUBLICATIONS

The multigraphed list of agricultural research institutions and library centers in foreign countries, originally compiled and distributed during the previous year with the cooperation of a special committee of the Association of Land-Grant Colleges and Universities, was revised by H. L. Knight, editor of Experiment Station Record. A report on the subject was presented by the Chief of the Office at the Chicago meeting of the association. Extensive use is being made of the list by experiment stations in this country, as well as by others to secure more efficient and economical distribution of station publications in foreign countries.

SERVICE ON NATIONAL RESEARCH COUNCIL

On nomination by the American Phytopathological Society and the American Society of Bacteriologists, H. P. Barss, recently added to the staff of the Office as specialist in plant physiology and pathology, was made a member of the National Research Council in the Division of Biology and Agriculture.

RESEARCH IN MEAT PRODUCTION

George Haines, specialist in animal husbandry, took part in a conference at Chicago of station and Department specialists engaged in cooperative meat investigations, and served on several committees of the conference, especially those on grading meats and on pork products. In this conference the work of the various experiment stations cooperating with the Department in the meat investigations during the preceding year was thoroughly discussed and analyzed. Consideration was given to the procedure followed, and especially to general recommendations for future investigations.

PASTURE AND HAY INVESTIGATION

H. W. Marston, specialist in animal husbandry and dairying of the Office, took part in the proceedings of the American Society of Animal Production at Chicago in November 1933, served as an unofficial member of the interbureau pasture committee appointed by the Secretary, and was made a member of the interbureau hay committee. These committees are typical examples of proposed cooperation on a large scale between Department bureaus and the experiment stations, which include the Office as a liaison agency.

HOME ECONOMICS RESEARCH

The specialist of the Office in home economics research, Sybil L. Smith, served on various committees of the American Home Economics Association, and took part in committee work and conferences relating to home economics research at the annual meeting of the association. She was chairman of the committee on research of the home economics section of the Association of Land-Grant Colleges and Universities, and presented a paper, Needs for Adjustment in Home Economics Research Programs at Land-Grant Institutions, at the Chicago meeting of this association. She prepared a list of home economics research projects and reports of the land-grant institutions for the year ended June 30, 1933, which was distributed by the Office in mimeographed form. Miss Smith also presented a paper, The Social Aspects of Home Economics Research, at a meeting of the Association of Southern Agricultural Workers, and one entitled Newer Trends in Nutrition, at the annual meeting of the Tri-State Dietetic

Association. In cooperation with the Bureau of Home Economics, she continued revision of a Department circular, Vitamins in Food Materials.

AGRONOMIC RESEARCH METHODS

H. M. Steece, agronomist of the Office, continued to serve on the committee on standardization of field experiments of the American Society of Agronomy, which formulates and recommends standard technic for field plot experiments in soil fertility and farm crops. He revised and enlarged the bibliography on standardization of field experiments published by the society. He was the representative of the Office at the 1934 meeting of the northeastern section of the American Society of Agronomy held at the New Jersey Agricultural Experiment Station June 21 to 23.

RESEARCH IN AGRICULTURAL ENGINEERING

Research in agricultural engineering received special assistance, as in previous years, by service of R. W. Trullinger, specialist in agricultural engineering research of the Office, on various committees of the American Society of Agricultural Engineers, and in other ways. He continued as a member of the research committee of the society, which deals with organization and coordination of research and the planning of research programs in agricultural engineering, and presented reports at the annual convention of the society on the selection and organization of equipment adapted for specific lines of engineering research, and on the organization and scope of research in rural electrification on the major Federal power projects. In addition, he supervised the preparation of a Monthly Digest of Agricultural Engineering Progress and served on committees of the society dealing with agricultural engines, research in tractor fuels and lubricants, and research in rural electrification. He was chairman of a joint committee on rural sanitation sponsored by the American Society of Agricultural Engineers, the conference of State sanitary engineers, and the public health engineering section of the American Public Health Association, and was chairman of an international committee on materials for agricultural machines, the purpose of which is to introduce greater economy and durability in machines, and to standardize their design. He also served in an advisory capacity to a committee on technical journalism, the purpose of which is to widen the usefulness of technical information by better journalistic presentation. He also was one of the official representatives of the society on American Engineering Council and was a member of its committees dealing with the engineering features of the production, distribution, and consumption of necessary commodities, and on land-utilization surveys and mapping.

RESEARCH IN AGRICULTURAL ECONOMICS AND RURAL SOCIOLOGY

Representing the Office in research in agricultural economics and rural sociology, B. Youngblood continued to serve as secretary of the joint committee on projects and correlation of research of the Department and the Association of Land-Grant Colleges and Universities, and assisted in preparing the report of that committee presented at the Chicago meeting of the association, which dealt primarily with the revision and readjustment of research projects and programs to meet emergency conditions. Toward the end of the year, on request of the Bureau of Indian Affairs of the Interior Department, Dr. Youngblood was assigned the duty of making a study of economic and social conditions among the Navajo Indians, particularly the operation of trading posts and the relation of the Indians thereto.

MICROSCOPIC TECHNIC AND APPARATUS

Papers, Preliminary Notes on Chromic Fixation in Alcoholic Media, and Notes on Belling's Green-Light Method for Critical Microscopy, by H. C. Waterman of the Office staff, were published in Stain Technology, volume 9 (1934), pages 21 and 23. A new type of microscope lamp, meeting the requirements of Belling's methods, was designed, constructed, and tested by Mr. Waterman. This lamp and its operation was, on invitation, demonstrated and explained before a scientific group of Johns Hopkins University in April 1934.

OFFICE PERSONNEL

An important change in personnel of the Office during the year was the appointment effective March 1, 1934, of H. P. Barss, formerly connected with the Oregon Agricultural Experiment Station, as specialist in plant physiology and pathology (principal botanist), to replace W. H. Evans, retired January 31, 1933.

Effective July 1, 1934, T. B. McClelland, who had served efficiently as director of the Puerto Rico Experiment Station since October 1, 1930, was transferred to the Division of Plant Exploration and Introduction of the Bureau of Plant Industry, and was succeeded as director of the station by H. Atherton Lee.

An act making appropriations to supply deficiencies in certain appropriations for the fiscal year ended June 30, 1934, and prior fiscal years, Public No. 412, 73d Congress, approved June 19, 1934, contained the following:

The unexpended balance of the amount appropriated by the Agricultural Appropriation Act for the fiscal year 1933, approved July 7, 1932, for salaries and general expenses, Office of Experiment Stations, including the salaries of employees appointed from the continental United States of the discontinued experiment stations in Alaska, Guam, and the Virgin Islands during *such leave as might be granted* them under the "leave" Acts cited in such Appropriation Act, is hereby made available for the payment of compensation in lieu of such leave to such designated employees as *remained without Federal employment subsequent to the discontinuance of their stations for a period or periods aggregating at least a year.*

A provision was included in the Agricultural Appropriation Act for 1933 providing for the payment of the accrued leave for these employees, but subsequently such leave was denied by the provisions of the Economy Acts approved June 30, 1932, and March 20, 1933. The above provision in the deficiency act makes these payments possible.

CHANGE OF OFFICE QUARTERS

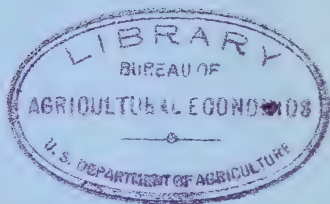
The Office, which moved to building C on the Mall on August 24, 1933, returned to space previously occupied in the south building of the Department on July 16, 1934. The improved quarters, and particularly the proximity to the library so restored, will aid greatly in maintaining efficiency of the work of the Office.

ON THE FRONT LINES WITH AGRICULTURE

A Report of Extension Work in
Agriculture and Home Economics
in 1934

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United States Department of Agriculture
Extension Service

Washington, D. C.

Issued January 1937

High Lights of Extension in 1934

During the 20 years since the passage of the Smith-Lever Act in 1914, extension forces have had no more varied program of activity than in 1934. The puzzling situations created by the drought were added to the work on production control, credit, and the usual problems of farm production, homemaking, and 4-H club youth.

Federal, State, and county extension forces cooperated with other Government agencies to help farmers to weather the crisis caused by short feed and seed supplies. Farmers called on county agents for information regarding late emergency crops, how to balance rations with the low-quality roughage on hand, and where to obtain feed and seed.

Extension agents continued to aid $3\frac{1}{2}$ million farmers with the problems arising out of the production-control programs, helped to train 118,000 committeemen to handle the signing and checking of contracts and other work, and assisted county production-control associations.

In helping the Farm Credit Administration to make credit more accessible to producers, county agents and State specialists assisted in the organization of 600 local production credit associations and gave 459,000 farmers aid in obtaining loans from Federal agencies.

More than a million farmers kept farm records with the assistance of extension workers. Producers obtained timely economic information from 4,443 local outlook meetings, and 5,490 cooperative marketing associations called on extension workers for aid. Increasing attention also was given to economic planning and development of agricultural policies best suited to different counties or States.

Farmers and homemakers received assistance in producing crops and livestock, improving housing conditions, conserving soil, controlling disease and insect pests, producing and conserving food, and making more comfortable homes. Farmers protected 20,000,000 acres of crops from grasshoppers and chinch bugs with methods taught by extension workers.

Work with boys and girls continued to flourish. Thirty-seven thousand older boys and girls developed programs of special interest to youth aged 16 to 25 years. This number with the 916,062 4-H boys and girls brought enrollment of youth in extension programs to 953,084.

Extension teachings were used by more than 4,000,000 families. Of this number 3,566,000 were farm and 638,000 nonfarm families.

On the Front Lines With Agriculture

A Report of Extension Work in Agriculture and Home Economics in 1934

Prepared by the Extension Service

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Meeting Complex Problems—An Introduction

Facing the most complex array of problems encountered in many years, American agriculture in 1934 moved forward toward a more stabilized industry, more adequate incomes, and a better living for farm families. Accompanying these gains were a growth in rural leadership and a more widespread and active cooperative spirit. Advances along literally a hundred fronts, made despite drought and other unfavorable circumstances, involved activities of agriculture, homemaking, and rural youth.

Farmers and extension workers have been struggling with agricultural problems for many years and making progress toward their solution. The year 1934 marked the close of two decades of extension work since the passage of the Smith-Lever Act of 1914. Some problems have been solved, many others still puzzle agriculture, and the job of unraveling the economic and social tangle has become even more complex because of domestic and international maladjustments. In 1934 the problem was further complicated by one of the worst droughts in history.

Agriculture continued to wrestle with adjustment of production to profitable and effective demand and then was forced by the drought to adapt its entire production scheme to offset the vagaries of Nature. During the latter part of the year conservation of seed, livestock feed, and food for human beings became the keynote of activities in a majority of States. Hand in hand with the drought came invasions of insects which, on many farms, threatened to consume what crops the drought did not ruin.

Farmers took advantage of improved credit facilities made available by the Government, and throughout the country they sought lower production costs and increased income. Prices of farm products were higher and total income was larger in 1934, although many farmers did not have as much to sell as in 1933. Benefit payments from Agricultural Adjustment Administration programs relieved the crisis on many farms.

In some States the more distressed farmers become more self-supporting through the aid of the rehabilitation workers with whom extension agents cooperated.

Increasing interest in more profitable farm management and more efficient marketing coincided with greater attention to all economic phases of farming. Protecting soil from the inroads of erosion continued to be a major problem. And farm families, as usual, maintained their interest in more comfortable and attractive farm homes and improved standards of living.

Pending the realization of incomes adequate to raise materially or restore living standards, farmers became more self-sufficient and used materials or facilities available at little or no cost. Finding satisfac-

tion in such activities as home-talent plays, music festivals, and similar group activities, rural people gave more attention to these matters.

Homemakers continued their efforts to maintain the comfort and health of the home at a minimum cost and 4-H club members adapted their programs to meet changing conditions. In an increasing number of States, older 4-H youth and former club members developed programs especially adapted to their age.

Extension Gives Valuable Aid

In helping farmers and their families to meet the problems of 1934, extension forces played an important part. As representatives of the United States Department of Agriculture and of the State colleges and experiment stations, extension workers had the busiest year in history. As in past years, the Extension Service carried to farmers, rural homemakers, and 4-H club members information on all phases of agriculture and home economics. It interpreted scientific facts developed by the United States Department of Agriculture and the State experiment stations and helped farmers to apply this information to everyday problems.

The extension forces explained to farmers the various programs of the Federal Government, such as production control, farm credit, rural rehabilitation, housing, soils, wildlife management, and drought, and helped them to make the maximum use of this assistance. Extension workers, because of their intimate knowledge of conditions in the field and the needs of rural people, not only helped in putting the programs into effect but in many cases helped to develop them.

380,000 Leaders Donate Time

Assisting the extension agents were 380,000 volunteer local leaders. Of this number 157,000 men helped with agricultural activities, 129,200 women led groups in home-project work, and 65,500 men and women served as local 4-H club leaders. More than 28,000 older 4-H club members or former members acted as leaders or assistants. In addition, more than 118,000 local men leaders and 11,000 women, paid from Agricultural Adjustment Administration or Federal relief funds, worked closely with extension agents on emergency programs.

Approximately 4,550 county associations with a membership of 778,900 rural people fostered extension work in 1934. These numbers are an increase over the previous year of more than 1,000 associations and 58,000 members. More than 52,600 communities had organized extension programs which in many cases included agricultural, home-economics, and 4-H club activities.

One evidence of the value of the extension program in helping farm families to meet their problems is the number of leaders who willingly give their time and energy without pay to help in organizing and conducting the local program. These leaders and the thousands of persons who demonstrated various agricultural or homemaking practices are the foundation on which the extension program is built.

Help 4,000,000 Families

With its system of county agents in all major agricultural producing counties and local leaders and demonstrators in a majority of communities, the extension program in 1934 furnished information or gave direct assistance to more than 4,000,000 farm families, according to records of the agents. Of this number approximately 3,566,000 were farm families, an increase of nearly a million over the preceding year. More than 638,000 nonfarm families made some use of extension teachings, largely in the field of canning and gardening.

Extension work was carried on during the year with a force of 5,181 county agricultural, home demonstration, and 4-H club agents. The county workers were aided by 1,166 State extension specialists, 539 county agent, home-economics, and 4-H club supervisors, administrators, and directors, and 45 field agents and specialists in the Extension Service of the United States Department of Agriculture.

Looking Ahead

In a speech made before the Land-Grant College Association in November 1934, Henry A. Wallace, Secretary of Agriculture, spoke of the need for a mechanism for a continuing agricultural policy, adding:

It would seem that the extension workers * * * guided by the scientific research in the experiment stations and in the Department of Agriculture and also guided to some extent by the state of public opinion as they find it, should be able to help formulate a policy which can be with us across the administrations.

The degree of participation of State, Federal, and county extension workers during 1934 in long-time planning programs, land utilization, resettlement, and the many projects having to do with development of economic and social as well as purely production phases of rural endeavor gives assurance that such assistance is being given.

New demands on research agencies of the Department of Agriculture and the Federal Government are already being felt. Throughout the States, the undesirable rural situations of the past few years have served to draw extension and research more closely together in the development of a coordinated program. This coordination will undoubtedly continue in future years as increased attention is given to the development of a long-time agricultural policy.

Applying Economics to Farming

Farmers in 1934 continued to seek adjustment and improvement in economic conditions affecting agriculture as a whole and those influencing the profit from their individual farms. Their interest in economic questions has been crystallized by years of emphasis on these matters by extension workers, by the trying times of the past few years, and by the various programs of the Federal Government which provide machinery for correcting certain maladjustments.

Farmers appreciate more than ever before the need for more economic information as a basis for their farm-management and marketing plans. Through extension workers, individual farmers obtained assistance in organizing their different enterprises to make the entire farm more profitable, in keeping farm accounts, and in improving marketing and financing.

New Emphasis on Economic Planning

Extension workers spent a considerable part of their time in 1934 working with farmers and interested groups in the analysis of public problems directly related to agriculture and ways and means of improving the agricultural situation in the areas involved.

Land-utilization and area-production policies occupied a prominent place in this work. Extension workers took the lead in many States and in local areas in developing agricultural policies which would not only conserve forests, wildlife, and the present productive capacity of the land but which would also promote a type of agriculture more in line with market-outlet possibilities and efficient farm-organization principles.

Such planning necessarily involved the consideration of local government costs and ways to reduce them, rural-taxation problems, transportation problems, and related matters. State extension economists frequently served as consultants for State planning boards.

Of the 107,000 days of county agents' time spent on economics extension work in 1934, 39 percent was spent on public problems and planning, 23 percent on farm management and outlook, 20 percent on farm finance and credit, and 18 percent on marketing. Voluntary leaders and committeemen assisted county agents by devoting 176,000 days to planning work.

Three and One-half Million Control Production

The year saw the enlargement of the program for the adjustment of production to profitable and effective demand. The Bankhead Act and the Kerr-Smith Act, as requested by producers, were incorporated in adjustment programs for cotton and tobacco. The first corn-hog adjustment campaign swung into action early in 1934.

County agents, State extension supervisors, and specialists joined with the Agricultural Adjustment Administration in giving rural people the economic facts underlying the adjustment program, helping farmers to understand the need for adjustment, in organizing and training committeemen, in showing producers how to meet the requirements of adjustment contracts, and in helping local associations and committees to function smoothly in administering and executing the local phases of the program.

More than 3,621,000 farmers signing production-adjustment contracts covering corn-hog, cotton, wheat, and tobacco, as reported by the Agricultural Adjustment Administration, are proof of the effectiveness of the educational work conducted by extension forces.

118,000 Committeemen Trained

County agents and State specialists trained, or helped to train, most of the 118,600 county and township committeemen elected by farmers to work on the production-control program.

In Iowa, the Nation's largest corn-hog producing State, where approximately 176,000 corn-hog contracts were signed, the 100 regular county agents and 53 emergency assistant agents held 9,815 meetings with a total attendance of more than 590,000 people, to explain the corn-hog program. These 153 agents spent 14,845 working days, an average of 97 each, on the corn-hog program. They trained, or helped to train, 8,681 local corn-hog committeemen.

To advance the program, the Agricultural Adjustment Administration gave much-needed financial aid to the Extension Service. States and counties gave all the financial assistance they could in hiring additional help. The financial resources of some States and counties were so weakened, however, by the economic situation that the Agricultural Adjustment Administration allotted funds to the Extension Service for hiring emergency county agents. These funds also made possible the hiring of emergency assistant agents in counties where the program was especially heavy, employment of additional supervisors, and the provision of extra supplies, travel expense, and clerical help.

Extension specialists and supervisors in most States planned their regular extension activities so that they could give more time to assisting with the production-control program.

Federal dairy, poultry, and economics specialists assisted the Agricultural Adjustment Administration to bring about the dairy-marketing agreements and helped the National Recovery Administration in preparing the hatchery code. The agronomists and livestock specialists aided in disseminating information on the use of land retired from production of basic crops, while the agricultural engineers assisted in such matters as developing methods for measuring acres under contract.

Credit Relieves Distress

Working with representatives of the Farm Credit Administration, county agents and extension specialists helped make more adequate credit available, not only to relieve current financial ills, but to establish a firm foundation for a long-time agricultural-credit program.

Help was given in establishing debt-adjustment committees in more than 2,700 counties in 44 States. These committees helped to scale down or otherwise adjust farm debts which had become oppressive because of low prices of farm commodities. The Farm Credit Administration reported that more than 40,000 cases involving approximately \$200,000,000 of principal indebtedness were adjusted so that farmers were able to keep their farms and homes and at the same time make a fair settlement to the creditors.

Extension forces assisted Farm Credit Administration representatives in the organization of 600 local production credit associations which are regarded as a major step toward a permanent credit program. County agents informed representatives of the Farm Credit Administration about conditions and need for credit in their areas and suggested the best locations for such associations. After helping to organize the associations, agents made producers more familiar with available credit facilities and the methods of using them to the best advantage. They helped approximately 459,000 farmers to get Federal credit in 1934. In turn, borrowers were urged by the Farm Credit Administration to adopt the farm practices recommended by the Extension Service.

Repay 96 Percent Within Year

The production credit association in Mississippi County, Ark., made emergency crop-production loans in 1934 to 241 farmers. The average loan was \$224 per applicant, or a total of \$54,045. Late in 1934, more than \$51,000, or 96 percent of the loans, had been repaid. In addition to helping to organize the association, the county agent offered his office as a clearing house for making and repaying loans.

The county agents of Fresno and Madera Counties, Calif., cooperating with the production credit commissioner for that area, called a meeting of farmers to explain the organization of a production credit association. Beginning business on December 12, 1933, the association at the end of 1934 had made 330 production loans totaling approximately \$680,000.

Million Farmers Keep Records

Increasing realization that farm records and use of better management practices are essential to profitable farming led more than 51,000 farmers to keep farm accounts with the help of extension workers as compared with 27,000 the previous year. The number of farmers keeping cost-of-production records increased from 22,000 in 1933 to more than 69,000 in 1934. Approximately 75,000 farmers summarized and interpreted these accounts in 1934 with the help of county agents and specialists.

Agricultural economists in the Federal Extension Service, cooperating with State economists and the Agricultural Adjustment Administration, developed a more simplified farm-account book to enable producers to record data needed in proving compliance with adjustment contracts. This record book is also valuable in recording data required by the Farm Credit Administration from applicants for loans. Distribution of these books was made through State extension economists and county agents.

County agents distributed 2,640,000 simplified farm-record books to farmers. More than 1,000,000 farmers called on county agents for assistance in keeping them. Use of the simplified Agricultural Adjustment Administration book does not replace established farm-account projects dealing with complete records and business analysis.

Accounts Point Way to Profit

In helping farmers to keep their Agricultural Adjustment Administration records, county agents were able to give them valuable information regarding profitable changes in their enterprises and at the same time to facilitate compliance features of the production-control program. This expanded farm-record project is laying the foundation for the development of future educational programs more on the basis of the farm business as a whole rather than on the basis of income from separate enterprises.

As a result of keeping records, more than 89,000 farmers made recommended changes in their business in 1934, or more than twice as many as did so the previous year. Nearly 300,000 farmers made some change in farm-management practices as a result of extension economics work, an increase of more than 100,000 over the previous year.

County agents in South Carolina induced 2,307 Negro farmers to keep accurate records. Nearly 500 kept enterprise records, 1,377 Agricultural Adjustment Administration records, and 434 cost-accounting records. Many of these farmers found that because of the dilapidated condition of their homes and the poor farming methods used, their applications for loans were rejected. In the process of rendering themselves eligible for loans they adopted many of the practices advocated by extension agents.

Outlook Guides Production

To help farmers to plan their production programs and to adjust their various enterprises to meet more nearly the expected demands, extension workers conducted 4,443 outlook meetings. In these meetings, information concerning supplies and probable production and demand was given. The State extension economists usually developed State outlook reports by adapting to local conditions the national report that is prepared in the Bureau of Agricultural Economics.

Outlook information during 1933 and 1934 was closely related to the various production-control programs and the regular farm-management program. In some States the educational meetings on adjustment programs and the outlook meetings were combined. Outlook information also is interpreted in terms of better management practices.

More than 428,000 hog producers were assisted in using timely economic information as a basis for readjusting their swine enterprises. This number compares with 54,000 in 1933 and only 38,000 in 1931. The number of farms assisted in using economic information as a basis for readjusting beef cattle, dairy cattle, cotton, corn, and wheat production increased in similar ratios.

Cooperative Marketing Increases

The cooperative marketing of farm products and purchasing of farm supplies had developed until in July 1934 more than 3,156,000 farmers were members of 10,900 cooperative associations, a gain of 1,500 associations over the previous year. Extension agents assisted in organizing 1,258 new cooperative associations during the year and aided 4,232 established associations to strengthen various phases of their activities. The 5,490 organizations thus assisted by extension workers in 1934 had a combined membership of more than 700,000 farmers, sold produce valued at \$283,395,000, and purchased supplies valued at \$31,250,000.

Extension workers assisted associations with organization work and legal problems, in establishing efficient business-management methods, in obtaining membership, in properly assembling, grading, packing, and finding markets for the produce, in using current market information, and in procuring necessary credit.

With the help of their own county agents, Negro farmers in Beaufort County, S. C., have organized a truckers' association and have begun to put their products on the market in a businesslike manner. Needing somebody to make contacts for them in outside markets, they found such a person in the county agent. A dealer in Savannah, Ga., bought 100 bushels of tomatoes by telegraph, and orders from other markets followed. This gave the agent an opportunity to teach the members of the association proper methods of picking, grading, and packing. From June 28 to July 13 the association's sales netted \$1,028 on a crop of tomatoes that the members would have been forced to sell for practically nothing on the local market.

In addition to the work with cooperative marketing organizations, county agents and other extension workers assisted 221,800 individual farmers with their marketing problems.

In some States information regarding markets, supplies, demand, prices, and similar data was supplied at monthly or other regular intervals to supplement the annual outlook report and to assist producers in marketing products at such a time and through such channels as would net the maximum returns.

Improved Quality Increases Income

Poultry specialists continued to conduct schools for farmers and dealers where the different standards of eggs and poultry and methods of grading and marketing were discussed. Dairy specialists emphasized the importance of selling high-quality cream, butter, and other dairy products on grade for a premium price. Similar work on market grades and quality has been done with orchardists, vegetable growers, and crop and livestock producers.

Cooperating with State colleges and the Bureau of Agricultural Economics of the United States Department of Agriculture, extension economists are helping to analyze the need for more adequate marketing facilities in local, regional, and terminal markets and to study the various handling costs, freight rates, distributors' margins, and other selling costs.

New Ideas in an Old Industry

As agriculture continued its efforts to do a better job of producing commodities for sale and for use on the farm, the world's oldest industry made increasing use of new methods in 1934. Farmers made 21,489,000 calls at county agents' offices to obtain information. This is more than two and one-half times the number of calls made the previous year and includes, of course, calls in regard to both regular subject matter and emergency programs. Approximately 6,166,000 telephone calls from farmers were reported by county agents, or double the number received in 1933.

Drought Strikes Agriculture

The worst rain famine in the Nation's history created new difficulties in 1934. Seared fields and pastures, blasted grain crops, starving and thirst-crazy livestock—all these multiplied agriculture's troubles. Federal, State, and county extension forces immediately joined with other Government agencies in a program to aid the drought-stricken farmers.

County agricultural drought committees worked with the county agent who usually acted as county drought director. He also served in most cases as executive secretary of the county committee, but without having a vote in making decisions. Farmers listed with county agents the number of livestock they wished to sell in the Government cattle- and sheep-buying programs. Extension workers helped with the appraisal and sorting of the livestock and in preparing vouchers and keeping the necessary records.

In Kansas alone, approximately 500,000 head of cattle were purchased from farmers for a total of more than \$7,000,000. Some of these cattle were processed by Federal relief agencies, and the meat was placed in relief channels. The Kansas emergency relief committee established 14 canning plants in the State and slaughtered several thousand cattle for feeding needy families in the State who otherwise would not have had meat.

Save 8,000,000 Starving Cattle

By January 1, 1935, more than 7,800,000 cattle for which feed was not available had been removed from 675,500 farms in the United States, while sheep and goats had been purchased from 27,500 farms in 24 States.

Livestock, dairy, and meat specialists of both the Federal and State extension services assisted by setting up standards for culling animals from herds and by helping to locate pastures where the animals could be grazed before slaughter. They also assisted in developing an adequate organization and methods of distributing the livestock and processed meat.

The first problem confronting farmers as the drought burned its way across the plains, was what crops to plant to produce emergency feed. County agents and State workers gave information on the best emergency crops for different areas through meetings, personal contacts, radio, newspapers, and by letter.

As the season progressed, farmers wanted to know how to make stunted corn fodder and other forage last the longest and feed the largest possible number of livestock. In many sections county agents and extension agricultural engineers gave farmers information on construction of trench silos and temporary silos with which they could conserve feed crops. Many farmers put up low-quality hay such as foxtail or even Russian-thistle and then asked county agents how to balance it with other feed to provide an adequate subsistence ration.

Assure Feed and Seed Supplies

County agents under the direction of the State extension services made surveys of seed and feed supplies available on farms. They then distributed information on the quantity of feed required to carry livestock through the winter so that farmers could balance livestock numbers and feed supplies.

County agents also helped farmers to take advantage of loans available through the Farm Credit Administration for the purchase of feed or seed and for the moving of cattle to better pastures. As surplus feed supplies were located, the Federal Livestock Feed Agency in Kansas City listed hay and other roughage available for sale and immediate delivery. The Government forage-conservation program guaranteed the farmer a price for baled corn fodder and other forage and caused a considerable quantity of that feed to be conserved for use in drought-stricken areas. Railroads gave reduced freight rates on feed shipped into drought areas and on livestock shipped from distressed territory to States having pasture. County agents worked long hours to assist all farmers needing these services.

As the season advanced, short seed supplies for the 1935 season loomed as one of the most dangerous results of the drought. Federal, State, and county extension agents cooperated with the Agricultural Adjustment Administration and Federal Emergency Relief Administration in locating and conserving seed supplies. They urged farmers to obtain local adapted seed in the fall and hold it for spring planting. During the winter, extension workers gave out information on available seed stocks, probable prices, and what crops farmers could plant most economically to provide feed in 1935.

Develop Water Sources

Farmers also called on county agents and State extension workers for assistance in developing water holes and springs and drilling wells to provide all possible relief for distressed livestock.

In Kansas, for example, extension forces actively supported the water-conservation program fostered by the Kansas emergency relief committee. Approximately 100 municipalities received some assistance on problems of water shortage. The number of conservation projects recorded up to the last of October 1934 included: 112 pumping plants established at ponds and rivers, 525 wells completed, and more than 1,200 farm ponds completed or under construction.

Protect 20,000,000 Acres of Crops

Invasions of chinch bugs and grasshoppers added to the distress in several States, threatening to destroy the crops left by the drought. With the assistance of county agents and State and Federal extension entomologists, farmers in 8 States combated grasshoppers with 59,812 tons of poison bait. In 6 States where the chinch-bug attack was serious, 5,340,000 gallons of creosote or similar oils were used by farmers. Farmers protected 20,000,000 acres of crops from the insects in these 14 States.

How determined was the fight on insects attacking farm crops last year is shown by reports from county agents in Kansas. More than 11,000 farmers adopted grasshopper-control practices recommended by county agents in 268 demonstrations, protecting 2,670,000 acres of crops. Nearly 600 demonstrations on chinch-bug control led 3,500 farmers to protect 1,142,000 acres of crops. Agents also conducted 95 demonstrations on control of hessian fly, wireworm, cutworm, and other insects.

County agents and extension plant pathologists received more than the usual number of calls for information on control of small-grain diseases through use of resistant varieties and seed treatment. Agents and State specialists assisted in the work of treating emergency seed stocks bought by the Government and conducted campaigns to induce farmers to treat seed bought from local sources. In many counties, agents helped to set up large-scale community treating equipment.

Improve Crop Practices

Winter legumes continued to be an important part of southern farmers' programs for soil improvement. An example of increased interest in winter legumes is found in Alabama where a total of more than 6,649,000 pounds of seed was used, an increase of 518,000 pounds over the quantity used in 1933. County agents in 68 counties furthered the program by helping to organize demonstrations and by assisting committeemen in taking orders for seed.

Some phase of pasture or forage-crop work was conducted in 42 States with local leaders and demonstrators cooperating. More than 9,500 farmers conducted some type of pasture demonstration on their farms in 1934, and 10,500 had soybean plots. More than 3,700 farmers grew alsike or white clover plots as demonstrations in cooperation with the county agent.

The development of hybrid corn was one of the high lights in crop work during 1933 and 1934. Supplies of hybrid seed corn in reasonable quantities are available in almost all the important corn-producing States. Experimental work and demonstrations on farms in which the hybrid is compared with the farmer's best seed almost invariably have shown more efficient production in favor of the hybrid corn. County agents and local leaders or cooperators have continued demonstrations on improved varieties of crops and cultural and harvesting methods.

Georgia Negro agents have done considerable work in demonstrating better production methods for corn and wheat. More than 1,300 corn-growing demonstrations in 1934 emphasized two particular points: (1) A production goal based on the probable needs of each family, and (2) the application of approved methods.

Rebuilding Burned-out Pastures

Farmers in many sections were faced with the necessity of restoring bluegrass and other permanent pastures which had been killed out. Following the recommendations of extension livestock and crop specialists, many farmers reseeded such pastures to a mixture of legumes and grasses to provide feed of higher nutritive value, restore soil fertility, and prevent erosion.

Farmers in the Eastern and New England States have found that the early cutting of grass hays is profitable. Extension workers and local leaders have demonstrated that early cutting causes little or no decrease in tonnage and gives a large increase in the hay's protein content.

The drought gave extension workers a chance to emphasize further the value of legume crops, especially soybeans and lespedeza. Soybeans have become a standard crop in most of the Central and Southern States and to some extent are extending into the dairy regions of the North Central and Eastern States.

Stopping the Soil Thief

Farmers and extension forces redoubled their efforts in 1934 to protect topsoil and fertility from theft by erosion of wind and water. Much of the work of the past year was made possible by cooperation with 200 emergency conservation camps, the rural rehabilitation division, and the Federal soil-erosion service.

Depending on local conditions and soil types, farmers are adopting programs of soil conservation, including various phases of engineering, forestry, and agronomy. Terraces, ditch dams, contour farming, strip farming, tree planting, crop rotations, green-manure crops, putting rough land back into pasture or hay, and use of lime, fertilizer, or manure are among the various practices which enter into the general soil-conservation program.

Crops, Terraces, Trees Protect Land

The Federal extension agronomist and agricultural engineer last year developed a correlated soil-improvement program including terracing, crop rotation, pasture improvement, use of lime and fertilizer as needed, and reforestation on land not well suited to crops or pasture. This program has been adopted by many farmers in the Southeastern States and is gaining favor in a number of Central States.

Farmers during 1934 constructed terraces and other erosion-control structures recommended by agricultural engineers on 40,300 farms. During the past 20 years, more than 18,000,000 acres of land on 600,000 farms have been protected from erosion by terracing as a result of the extension program.

Information concerning drainage, irrigation, land clearing, terracing, ditch damming, and similar practices was used by 17,300 farmers in 1934. This number probably does not represent the total influence of extension work because of the widespread cooperation between extension workers and other agencies engaged in a variety of land-improvement activities.

A program for soil improvement was conducted with the rural rehabilitation division to supply facilities for erosion control and soil improvement where such assistance was essential to rehabilitating farmers.

Saving Soil Saves Money

The following report from Wisconsin shows the value of proper handling of soils:

Except for a tier of counties along Lake Michigan most of Wisconsin requires application of lime for the growing of legume crops, especially alfalfa and sweet-clover. Supplying dairy herds with protein feed has caused a cash outlay of approximately \$25,000,000 for feed shipped in each year.

Our recent excursion in agricultural depression has proved the necessity for a dairy farmer to become more self-sufficient in producing his feed. A project established in cooperation with the Wisconsin Emergency Relief Administration is supervised by the extension soil specialist and county agents. Some counties had as many as 10 or more work units producing agricultural limestone.

New York, Wisconsin, and other States have made considerable progress in classifying fields according to their best use. In Wisconsin, 4,700,000 acres of land are restricted against agricultural settlement.

Indicative of the demand from farmers for assistance in soil improvement is a report from the county agent in Cleburne and Stone Counties, Ark., who said:

We have given 13 terracing demonstrations in as many different communities and have run lines on 115 acres of farm land. We have had so many requests for terracing this fall that if it were possible, we could spend our entire time on this activity. We plan, however, to take care of these requests by conducting a terracing program in cooperation with the local FERA office.

Protective tree-planting projects were popular throughout the States. Establishment of demonstration belts of trees to prevent dust blowing and to protect livestock is a new feature of the Nebraska program. Farmers throughout the country are making use of trees and cover suitable for wildlife protection to check erosion in gullies and are replanting hillsides and rough land which should never have been put into cultivated crops.

Trees for Profit and Protection

Farm forestry not only has its place in erosion control but has a direct cash value to the farmer. Under extension guidance, citrus growers in California are beginning to plant windbreaks to protect fruit trees. Planting of slash pine for turpentine production is gaining headway in Georgia.

Farmers are depending on county agents and State extension specialists for information concerning the management of farm woods, including such matters as estimating, protection, proper cutting, weeding, and pruning. With projects on wood-lot management being conducted in 22 States, approximately 19,000 farmers used approved thinning and weeding practices, selective cutting, and forest-tree pruning methods.

Timber-marketing problems have been studied, lists of buyers and marketing reports issued, marketing activities organized, and literature on marketing methods has been distributed. The cooperative marketing of Christmas trees in New Hampshire has been profitable, and in Connecticut, establishment of standard grades for fuel wood is one of the most recent forward steps.

Livestock Industry Progresses

Confronted with the usual problem of utilizing livestock feed to the best advantage, combating livestock disease and insects, and managing herds to provide the maximum profit, farmers were eager for every scrap of information that would help them to weather the crisis. With the production-control programs, the drought, and other activities adding to the perplexity of the livestock producer, extension agents were able to serve him in a more definite and far-reaching way.

Farmers used extension information in making the best use of rented or contracted acres to produce more adequate supplies of legume hay and pasture. Shortage of feed supplies forced attention to the use of substitutes in rations to make supplies last as long as possible and to provide the most nutritive value. Economy in utilizing all feed supplies available to carry the animal population through the winter became the watchword on the range and in the feed lot.

Farmers in the Southern States found their greatest obstacle to profitable dairying in the lack of an adequate supply of home-produced feed. Extension specialists and county agents have staged pasture, roughage, and silage campaigns. As a result of such work, one Southern State reported a production of 699,000 tons of hay, an increase of 29 percent above the 10-year average, and the filling of 427 silos. More than 6,800 pasture demonstrations were conducted by farmers cooperating with county agents in the Southern States during 1934.

Dairymen Cull Low Producers

Dairymen, along with other livestock producers, are improving their methods of breeding and are culling the lower-producing animals to increase profits from the herd. The Bureau of Dairy Industry reported that there were 809 dairy-herd improvement, or cow-testing, associations at the end of 1934. Farmers who were members used association records as a guide in culling the lower-producing cows. The cattle-purchase program in connection with the drought, the Jones-Connally Act for tuberculosis eradication, and Bang's disease control activities gave dairymen a chance to eliminate the less profitable or diseased cows. Use of purebred bulls or bulls with known high-producing ancestry is increasing in most States.

Dairy farmers and extension workers in Montana, Colorado, Washington, Oregon, and California have given considerable attention to the improvement of quality. Tennessee and Texas have made agreements with creamerymen to grade all dairy products purchased and to pay according to grade.

Intensify Disease-Control Efforts

Farmers took definite forward steps in the control of livestock diseases, additional work having been made possible by the appropriation of emergency funds through the Agricultural Adjustment Administration and the Bureau of Animal Industry. As a result of the work on eradication of bovine tuberculosis, conducted by the Bureau of Animal Industry with the cooperation of extension workers and representatives of the State departments of agriculture, Washington, Illinois, Virginia, Oregon, and Minnesota were added to the list of officially designated modified accredited areas.

Farmers took advantage of a program for Bang's disease control, made possible by the allocation of emergency funds, to have approximately a million head of cattle given the agglutination test. They later removed approximately 150,000 head of infected animals from their herds. The cattle tick eradication program was speeded up by an increase in funds from the emergency appropriation. Livestock specialists and county agents increased their activities in the screw-worm control campaign in the Southeast where the livestock industry has been threatened by invasion of this serious pest.

Many farmers, who in past years bought a large part of their meat, produced more of it at home during the last 2 or 3 years because of decreased cash with which to make purchases. Several hundred home-constructed ice-chilled meat-curing boxes have been added to the equipment of southern farmers. These boxes have aided in economical production of meat supplies for families that are trying to balance both their meals and their budgets.

Fruit, Truck, and Bee Problems

Control of insects and diseases, production of higher-quality fruits or vegetables, and use of better varieties continued to be the major problem confronting the Nation's orchardists and truck farmers. About 3,000 farmers in Connecticut with small orchards or a few fruit trees, previously having little contact with the Extension Service, received assistance in spraying and fertilizing their trees. The State horticulturist trained dealers in spray materials and fertilizers who passed on the extension recommendations and a spray bulletin when farmers purchased supplies.

In New Hampshire the 90-percent-clean-apple club was continued with 132,000 bushels entered in the contest. Of this quantity, 66,300 bushels passed the crucial test. Demonstrations in Pennsylvania proved that the use of pollen from Delicious, Golden Delicious, Grimes Golden, or Jonathan apples on York imperial apple blossoms increased the yield. Jonathan pollen increased the yield 7, and Grimes Golden pollen $5\frac{1}{2}$ bushels per tree.

Farm beekeepers increased their calls for assistance last year. Entomologists and county agents helped farmers to use the best methods of management to obtain the maximum honey production. One State reported 800 colonies of bees transferred from box to modern hives. The value of this practice is shown by the fact that in 37 demonstration apiaries in one State, bees produced an average of 62 pounds of honey per colony, while those housed in box hives averaged only $9\frac{1}{2}$ pounds.

Poultry Farmers Ask Help

Because poultry is raised on a majority of farms and helps to pay current cash expenses, farmers continued to flood county agents and State specialists with requests for help in flock management. These questions dealt with control measures for diseases and parasites, feeding of adequate rations, methods of culling and selecting breeding stock, and plans for poultry-house construction.

In Maine the "Increase-your-income-with-poultry" campaign is pointing out how, with favorable market situations, farm incomes may be raised through better balance of farm enterprises and more efficient use of labor.

Determining the sex of day-old chicks was a new phase of the baby-chick industry that gained attention in 1934. Extension workers and representatives of the Department of Agriculture held schools for 2,364 hatcherymen and breeders where methods of determining the sex of day-old chicks were taught.

Farmers Also Are Engineers

Farmers found numerous uses for agricultural-engineering methods in producing crops and livestock with less labor and at lower cost. In addition to using engineering information in terracing, drainage, and irrigation, thousands of farmers found ways to reduce labor, power, and equipment costs. Approximately 18,600 farmers used extension information in the maintenance or repair of machines at a total value or saving of \$155,650. More than 7,600 farmers used better types of machines, and 9,300 farmers report more efficient use of machinery.

From building plans furnished through extension workers, farmers in 1934 constructed 3,970 dairy buildings, 14,000 silos, 3,940 hog houses, 15,900 poultry houses, and hundreds of other structures. Many States place illustrated catalogs of building plans in the hands of county agents, vocational teachers, dealers, and builders, thus not only making the information available to farmers but influencing dealers and carpenters to build the right type of structures.

Home Demonstration Work Meets the Need

Emergency adjustments in the home demonstration program were contributing factors rather than interruptions to the regular work. The long-time or regular program went forward according to the well-established projects, with no change in objectives, but some shifting of emphasis to meet emergency conditions. All home demonstration programs are planned to meet the needs of farm families, especially those with low incomes. Though some farm families had larger incomes in 1934, so many found it necessary to meet overdue obligations, pay for long-needed medical and dental care, repairs or replacement of automobile, or necessary farm machinery, that the home program was continued on a small spending basis.

The live-at-home program is no longer considered an emergency one, but is a cross section of the entire home demonstration program. Some projects that received renewed emphasis in 1934 were adequate family gardens; greater home production of meats, dairy products, and poultry; preservation of vegetables, fruits, and meats; renovation and remodeling of clothing; home-made equipment; utilization of materials on hand for making rugs and other house furnishings; making mattresses of surplus cotton; and wise selection and economical buying of supplemental household and family supplies.

Some farm homemakers returned to the more primitive practices of making soap at home, baking all their bread, making corn and wheat hominy, cheese making, hand carding of wool for comforters, rug-making, weaving, and other home crafts, and exchanging goods by barter. Pioneer measures were not taken by choice and were not looked upon as permanent. The farm women of North Dakota learned by careful record keeping that they saved an average of 9½ cents per 2-pound loaf by baking bread at home.

In the National Agricultural Outlook Conference of 1934 an outlook for farm family living was developed. This report dealt with the probable cash income for family living; changes in prices for food, clothing, and operating and building materials; home food production, and other economic changes affecting family living. It afforded interesting information for discussion groups of farm men and women. In Montana the family outlook report was carefully adapted to different districts of the State.

Farm women continued their efforts to increase the family income. As in previous years, they found the curb market a profitable means of selling graded and standardized garden, dairy, poultry, and canned products, baked goods, and other well-prepared foods. The advice of extension agents was a factor in the success of 161 farm women's curb markets in 14 States in 1934. In North Carolina alone, 27 farm women's markets had a total business of \$484,565 for the year.

The success of this cooperative enterprise is due to good business management and to the fact that women work together congenially, are loyal in not encroaching on one another's specialties, and are

honorable in living up to the stipulated rules regarding prices, weight, and quality of products. The women look forward to market day as a social occasion, as well as one of financial gain. The market is a means of developing a cooperative spirit between women on the farm and in the towns. Women have been given instruction in salable standards in foods and crafts for roadside marketing, especially in the Eastern States. In New Hampshire each year a roadside market operators' conference is conducted by the Extension Service.

Extension workers did not concern themselves wholly in 1934 with helping the farm family to live within the resources of the farm, as important as that is. Though the standard of living might be temporarily lowered for some, it does not follow that the standard of life should be lowered. Home demonstration agents attempted to enrich the everyday life of the farm family by encouraging them to improve the design and color of clothing, to have attractive but simple and inexpensive house furnishings, to practice home arts and crafts, and to create and preserve beauty in the countryside. The program placed emphasis on appreciation of good music and pictures, selection of reading, exchange of books and magazines, suggested hobbies, pageantry and plays for the community, camps for women and for girls, and organized play for home and community. Gatherings of various kinds sponsored by the Extension Service stimulated neighborliness. Farm women received a continuing education from home demonstration meetings. New friends made and knowledge gained stimulated new incentives.

The Test of Emergency

Extension forces met successfully the test of emergency in the national relief programs, the surplus-cattle-buying program in the drought areas, in rural rehabilitation work, and in agricultural adjustment. The benefits of all these activities reflected directly into the farm home.

The emergency relief administration in each State employed emergency agents and social case workers in an educational program with relief families. State and county home demonstration workers cooperated in an advisory capacity in planning adequate nutrition at minimum cost for rural families on relief, in the home and community garden work, in the canning program, and in the installation of hot school lunches. The Extension Service provided the necessary technical information and in most States trained the emergency agents. In each of 13 States an extension nutrition specialist was lent during the food-preservation season to the State emergency relief administration.

The canning, sewing, and mattress-making centers established throughout the country by the relief administration were supervised by local leaders who were given special training and guidance by State and county home-demonstration workers. Most of the local leaders were women who had been volunteer project leaders in home demonstration groups. In Arkansas in 1934 there were 1,379 community canning centers supervised by 1,023 women who had been home demonstration project leaders or demonstrators. Their work resulted in the putting up of more than 11,115,000 cans of vegetables, fruits, and meats, of which 2,383,000 cans were retained and distributed to needy families during the winter.

In several areas where cattle suffered for lack of feed and water because of drought or other conditions, a cattle-buying program was set up by the Agricultural Adjustment Administration, cooperating with the Federal Emergency Relief Administration. Cattle purchased were shipped to greener pastures or canned for relief use. The relief administration established the canning centers and furnished equipment. Relief labor was employed. Home demonstration workers again filled an emergency need and trained the supervisors of the canning centers in plant management and canning methods. The meat-canning work in Texas was done on a large scale. In 21 plants 50,000,000 no. 2 cans of beef were put up. These plants, including the abattoirs, employed 20,000 relief workers for a period of 6 months. The Extension Service trained the supervisors of the canning plants and those who directed the slaughtering, cutting, boning, and refrigeration.

The rural rehabilitation program of the Federal Emergency Relief Administration got under way in 1934 in most of the States. Families on relief who wished to become self-sustaining became certified rehabilitation clients and were assisted by the home rehabilitation workers. Many of the State, district, and county home rehabilitation workers had had Extension Service experience. The home demonstration forces helped to train the home rehabilitation workers and cooperated in carrying out the home rehabilitation program, which included a live-at-home plan, the more careful budgeting and expenditure of family income, health protective measures, child care, sanitation, improvement of home and personal appearance, and recreation.

Farm Women Assume Leadership

Local volunteer leaders who had been trained through home-demonstration work assisted creditably in emergency activities. Utah reported that 87 percent of the local women who served on county relief committees or as relief project supervisors were home demonstration project leaders.

There were 129,000 volunteer leaders in 1934 who assisted in conducting home demonstration work. The number of women who gave time and effort without financial remuneration to home demonstration activities and to 4-H club work with girls totaled 171,000. These leaders felt repaid because of the training and experience gained and the satisfaction of working with extension agents in helping friends and neighbors.

Local leaders, through the county councils and committees, assisted extension agents in shaping the immediate and long-time county programs, setting goals, and planning fair exhibits, camps, and other activities. More systematic use was made of local leaders in extension news writing. In Ohio in 1934, 76 radio talks relating to home demonstration work were made, 16 of which were given by farm women. Trained local project leaders did creditable work in passing on to local groups processes, techniques, and information. The neighborhood-leader plan used in 14 counties of California was a conspicuous example.

Foods and Nutrition

Home demonstration workers emphasized the relation of food to health by pointing out the connection of good growth and development with correct food and health habits, presenting information concerning the causes of overweight and underweight, and showing that many adult ailments are the result of faulty food and health habits. They helped mothers of infants and preschool children to solve their nutrition problems and to take advantage of the guidance available from the Extension Service. In 1934 the number of adult result demonstrations relating to foods and nutrition reached 120,700 and 4-H club result demonstrations 246,500.

Food production and preservation were given increased attention in the live-at-home and emergency programs. The estimated value of the products canned or preserved according to methods recommended by the Extension Service was \$18,681,000.

Clothing the Farm Family

Clothing the family continued to be one of the major problems confronting homemakers. They were given assistance in construction processes, in selection, renovation, and care. Clothing project leaders conducted some phases of the clothing project in a large number of counties without home demonstration agents. In numbers participating, the clothing project led all other home-economics extension projects in 1934, with 1,276 agents reporting 304,000 women enrolled in clothing construction and 1,432 agents reporting 211,000 members in 4-H clothing clubs. The total estimated saving due to the clothing program was \$2,132,000.

Economies held first place in the clothing project. Continued interest was shown in making old clothing look up-to-date and in methods of remodeling and dry cleaning. Some farm families had a little more money to spend for clothing in 1934. Studies in better buying were made to familiarize the women with information on textile values, cut of garments, cleaning and laundering qualities, and standard sizes. Standards in dress of farm people were found to be commendably higher than they were 15 and 20 years ago. The improvement is not due to excess expenditure for clothes, but to education in what is healthful, appropriate, and attractive, and can be credited largely to the influence of extension instruction. Increased self-confidence and assurance on the part of farm people have accompanied the higher standards of personal appearance.

Home Management

Home-economics extension workers gave increased emphasis to the extending of information on budgeting funds, on keeping household accounts, and on making the food dollar and the clothing dollar go farthest through intelligent buying. The keeping of both farm accounts and home accounts was given impetus by the agricultural adjustment and rural rehabilitation programs. Six hundred eighty-two extension agents reported more than 20,000 families keeping home accounts according to a recommended plan. 4-H club girls found that personal account keeping was a profitable activity.

Consumer education was expanded. A number of States held training meetings for local leaders at which buying problems were discussed and information on brands, labels, and advertisements was presented. Utah held a State meeting which was attended by the county home demonstration agents and 25 representative local leaders from all sections of the State. Some States featured household buying problems in radio programs and in skits and playlets at meetings and camps. Better buying was reported by 34,900 families. Among the demonstrations which had for their ultimate goal the conservation of time and energy were those in labor-saving home equipment, kitchen improvement and rearrangement, better laundry methods, improved housekeeping methods and schedules, and installation of modern systems for water supply, sewage, lighting, heating, and refrigeration. Reports show that 52,000 families made or purchased labor-saving equipment and more than 44,000 families improved kitchens according to recommendations.

Parent Education

There is a growing demand for extension assistance in the subject of child development. In most States some phases of child development were correlated with the foods and nutrition, clothing, and home-management projects. In 1934, 395 county extension agents reported that almost 70,000 farm women participated in the parent-education program, and as a result the habits of children were improved in 51,000 families and better and safer play equipment was provided in 15,000 homes.

Through the instruction parents acquired greater knowledge and understanding of their children and as a result gave more systematic time and thought to their training. Though discussion groups were organized primarily for mothers whose children were of preschool age, the field of study ranged from the infant through adolescent youth. Sometimes meetings were held in the evenings so that fathers as well as mothers might attend.

Some of the subjects studied and discussed were habit training, obedience and self-reliance, behavior problems, toys and play, training children in the use of money, books and reading, music and pictures, children and the "movies", and prenatal care. The child-development subjects that were correlated with the clothing project were self-help clothes, health and hygiene in relation to clothing, and early training in care of clothes. Those aspects connected with the nutrition project were how to get children to eat the right foods, regularity of meals, and table manners. The child-development phases of the home-management project included the provision of play space in and outside the house and storage space for toys and children's clothing, allocation of labor within the home among all members of the family, relation of fatigue to home atmosphere, and family councils.

Home Health and Sanitation

In most home demonstration projects the results tend toward improved living conditions which promote better health. The health educational work in which extension agents engage deals only with preventive measures and positive health, and health teaching is

correlated with the nutrition, clothing, home management, and home improvement projects. The Extension Service cooperates with State departments of health, especially in the preschool-child health clinics and in the distribution of publications on maternity and infancy.

Such sanitary measures as screening against flies, good ventilation, pure drinking water, sewage disposal, and adequate provisions for bathing were considered in home-improvement programs. Spring clean-up campaigns and home and yard improvement contests held in some States resulted in improved sanitary conditions in a large number of farm homes and communities.

Health and food-habits score cards were helpful with adults as well as with 4-H club boys and girls in teaching positive health standards. Emphasis was given not only to proper living and food habits, but also to physical examinations, better care of teeth, sensible shoes, correct posture, proper rest, and recreation. In 4-H club work in 1934, 89,000 health projects were completed and 108,000 club members made improvements in health. At least 222,900 individuals adopted preventive measures to improve health; 58,000 families adopted control measures against flies, mosquitoes, and other insects; and 41,000 sanitary closets were installed.

Improvement in Farm Living

Developing Community Life

A field of extension work which in recent years has received increasing attention both from extension workers and farmers is the strengthening of community organization and the development of community or group activities. Rural sociologists have been perfecting programs to provide training for leaders of local organizations or groups and to help local units of farm organizations function effectively in promoting community growth.

Nearly 4,900 communities were given assistance during the year in making social or country-life surveys and in improving their local organizations. Nineteen thousand community groups received help with problems of organization, programs of activities, and programs for local meetings. More than 6,000 communities received assistance from extension workers in establishing work centers for canning, seed treatment, meat curing, and other activities which may be done for the individual on a community basis more efficiently than he can do it himself. Two thousand nine hundred communities asked for assistance in providing library facilities or in improving those already existing.

Improvement of Homes

The national rural housing survey made in 1933 by the Bureau of Home Economics and the Extension Service cooperating showed the need of improvement in rural housing. Problems most frequently encountered were poor arrangements of rooms, houses too small for the size of the family, insufficient light, lack of storage space, insanitary floors and furnishings, and general unattractiveness.

In 1934, to correct some of these conditions, extension agents gave suggestions for remodeling and for inexpensive improvements to make old homes more livable. Rural-engineering specialists assembled plans for building houses that would be practical and appropriate for a given locality. The Federal Housing Administration cooperated in furnishing housing information. Extension agents reported that in spite of the high cost of building, 1,978 farm dwellings were constructed according to plans furnished and 5,987 remodeled.

The house-furnishing program made marked progress. Women and girls gladly accepted information and suggestions for making the home restful and attractive. The 4-H house-furnishing clubs had an enrollment of 86,000; 117,000 families improved their selection of household furnishings; and 108,000 families repaired or refinished furniture. The interiors of many homes were improved by the refinishing of old furniture, harmonizing of colors, and proper arrangement of furniture. Such simple changes as dyeing of inexpensive drapery material for color effect, the addition of home-made rugs, and the proper placing of flowers added beauty to many unpreten-

tious homes. Where funds were available, more elaborate improvements were made.

The improvement of home grounds made steady progress as an extension activity; 64,600 families followed recommendations in planting shrubbery and trees. Demonstrators usually follow a plan, and the improvements sometimes are under way for 3 or 4 years. Plans involve the cleaning up and painting of the entire premises, the making of open lawns, foundation plantings, the use of native shrubbery, planting of trees where needed and flower gardens in appropriate places, and improvement of walks and roadways.

Rehabilitating Distressed Farmers

Extension workers cooperated with the Rural Rehabilitation Administration in bringing assistance to the more distressed farmers who were in serious need of assistance to enable them to make a living and keep their farms. Some farmers were assisted through Federal loans to purchase better land on which they could expect to become self-supporting and to provide necessary livestock and equipment. County agents assisted in outlining plans, gave subject-matter information to groups of families being rehabilitated, and gave advice and assistance in the development of community work centers and other work projects.

In Randolph County, Ala., the rural-rehabilitation program was started in April 1934. The county agent was a member of the county committee which classified applicants for rehabilitation. Four farm foremen were employed to visit applicants and make out farm programs including necessary stock and equipment needed. These foremen were guided by the county agent's recommendations in making out individual farm plans. One hundred and six families were rehabilitated at a cost of \$14,000, all of which has been repaid except \$800.

4-H Clubs Busy and Happy

The year 1934 found nearly a million boys and girls in 48 States, Alaska, and Hawaii engaged in 4-H club activities. As in other extension work, the past year marks the close of 20 years of development, during which time 4-H club enrollment has grown from 228,000 to 916,062. In addition, 37,022 young people, above club age, developed programs to bridge the gap between 4-H and adult organizations.

About 366,700 boys and 549,300 girls were enrolled in 55,687 local 4-H clubs. Approximately 71 percent of these club members satisfactorily completed all their 4-H club requirements during the year.

The Boy and His Business

More than 128,000 boys took part in major livestock projects. In some sections of the United States the sheep project showed an increase in size, probably because of the comparatively small financial investment necessary to purchase foundation stock. In areas most affected by the drought, some club members were compelled to sell their club livestock because of a lack of feed. Rabbit production for meat and fur continued to interest many clubs.

Throughout the United States 46,000 club members owned and cared for 40,400 dairy cows and calves. Twenty thousand members of beef clubs raised 20,400 animals. Approximately 33,000 sheep were cared for by 15,600 members, and 82,000 head of swine were reported by 59,000 boys and girls engaged in that project. Addition of the colt club to the program in several States brought the total enrollment in horse-and-mule projects up to 3,600 members. Club members continued to find poultry an interesting project, with 99,000 boys and girls caring for 2,245,000 birds.

Seek Economy

Club members not only learned to produce high-quality livestock, but to do it economically under existing farm conditions. In Kentucky, for example, the baby-beef project has been put on a firm economic basis intended to take it out of the speculative field. Instead of buying beef calves from a breeder or shipping them in, most club members are using home-produced calves and raising their own feed. For this reason the beef-club project has carried itself along with its own momentum during the time of emergency at a smaller cost and risk to club members.

Indication of the way in which club members, like their elders, are influenced by economic conditions is found in the growth of the horse-and-mule project. In Illinois the colt project showed a gain of 130 members in 1934. This growth probably is a result of increased interest in horses and mules as a source of economical farm power.

Crop Clubs Feel Drought

As in the case of livestock, 4-H club crops projects have been influenced considerably by current economic conditions, and also by climatic conditions. The drought ruined a large number of club fields, but in areas not greatly affected by the drought financial returns showed a decided improvement. Interest in corn, cotton, potato, wheat, alfalfa, and other clubs flourished. Fifty-six thousand members grew 64,000 acres of corn, and 22,000 boys reported 18,000 acres of cotton.

In Pennsylvania older club boys conducted complete demonstrations in the production of potatoes, involving the use of disease-free seed, proper fertilization, cultivation, spraying, and keeping of cost-account records. Several of the Maryland clubs own power sprayers which were used to maximum capacity.

All over the country, club members grew corn and other feed and forage for their own livestock. Many club members supplied the local markets with adapted seed corn, and an increasing number of club boys became associated with the States' crop-improvement associations. In Missouri a new Korean lespedeza project helped to utilize part of the acreage contracted with the Agricultural Adjustment Administration and demonstrated the value of this legume.

Plant Millions of Trees

Increased public interest in the whole matter of forest conservation was reflected in the additional attention given by 4-H club boys to forestry projects. Some 10,000 boys and 3,000 girls were enrolled in forestry in 1934. They worked on planting and care of shelter-belts or windbreaks, management of wood lots, and proper utilization of wood and lumber in conservation of timberland.

During the past several years approximately a million trees a year have been planted by New York 4-H club members. One phase of 4-H forestry in Wisconsin included the establishment of school forests, with 97 such areas now in that State. New Hampshire reports that more boys continue to improve more woodland each year. In many forestry projects stress has been laid on the value of the work as an adjunct to wildlife management on the farm.

Engineering Attracts Boys

In Michigan more than 5,000 handicraft-club members constructed farm and home equipment. More than 1,000 club boys in Nebraska took part in woodworking, gas-engine operation, or surveying projects. As a result of the "fix it" project, a typical example of how the club program is being adapted to meet emergency needs, many Nebraska club boys repaired machinery or other equipment which might otherwise have been discarded.

Because of the increased emphasis in recent years on economic problems, farm-accounting work for club members is receiving increasing emphasis in many States. Hundreds of club boys keep complete records on their fathers' businesses, and in many cases the fathers thus become interested in better management methods.

Half a Million 4-H Girls

More than 549,000 girls participated in club projects which not only gave them valuable training for future life but had a direct bearing on the farm home. Knowledge gained by club girls in home furnishing, clothing, foods, management, and other regular educational projects was often utilized to make farm homes more comfortable and attractive.

That the value of club training does not stop when the girl leaves her local club is shown from the fact that cooperative houses at Kansas State College, University of Kentucky, and University of Illinois were operated by 4-H girls. These club girls did their own canning and raised their own gardens in order to economize on living costs. From many States came reports of young farm homemakers who daily apply facts learned in 4-H-club days.

Clothing Maintains Popularity

A review of girls' club enrollment through the last 20 years shows that the clothing project has exceeded that of any other. The 329,000 girls enrolled in clothing projects in 1934 represent an increase of 5,000 over 1933. Club girls studied dyeing of materials for remodeled garments, exchange of patterns, new ways of utilizing old materials, and remodeling older garments to bring them up to the minute in style.

Club girls demonstrated their ability to make for themselves attractive garments which reflect their knowledge of designing, color harmony, appropriateness, and construction. In California, Iowa, and some other States, shoe selection was again given emphasis from the standpoint of both economy and health.

Girls Can 7,000,000 Jars of Food

Club girls found an added incentive during the year to partake in canning and food-preparation projects because of the necessity of using in the home the products of the farm garden. The 165,500 members enrolled in food projects canned more than 7,000,000 jars of food products. Most of these canned foods were used for family consumption, although a certain proportion was sold by the 4-H club members in their wayside markets. Club girls not only grew gardens and canned vegetables, fruit, and meat, but helped to plan food and canning budgets for their families. They also planned, prepared, and served family meals and kept food-cost records.

Thousands of farm homes were made more attractive and comfortable by the 77,000 girls enrolled in the home-management, home-furnishing, and handicraft projects. Refurnishing and rearranging their own rooms often led the girls to extend their knowledge to the rest of the home. At a relatively small cost, furniture was repaired or refinished, floors and walls were improved, rugs were made, and farm grounds were beautified as a result of 4-H activities.

When Work Is Done—Recreation

Club leaders of 1934, as in past years, faced the problem of helping club members to utilize their leisure time in a worth-while and enjoyable manner. Experience in music, dramatics, organized play, and

other activities conducted by 4-H clubs not only serves the immediate purpose of keeping members busy and happy but gives them training which will enable them to enjoy life more as adults.

Club members in each county in Maine held a field day which included a program of competitive games. Georgia, North Carolina, and Oregon reported recreational activities in the programs at all 4-H club camps. Boys and girls in some of the Northern States, especially New Hampshire, Minnesota, and Michigan, participated in 4-H winter sports tournaments.

Music and Dramatics

Good music has been making a place for itself in the 4-H club program for several years. During 1934 its popularity became more noticeable with the increasing number of 4-H club bands, orchestras, choruses, and quartets. In many States the best talent in the county organizations was combined into a State orchestra or chorus, which gave concerts during the annual State 4-H club conference or the State fair.

Arizona reported an increasing demand for enlarging its music program, and in Massachusetts a determined effort was made to interest every 4-H member in music appreciation.

Presentation of suitable one-act plays provided not only a recreational outlet for club members but entertainment for the entire community. In many States, intercounty or State-wide dramatic tournaments gave club members an opportunity to compare their productions with those of other clubs and gave recognition to outstanding dramatic achievement.

In 15 States, club members broadcast regularly over radio stations located at the agricultural college, and in other States a large number of clubs gave programs over their local stations. For the fifth consecutive year the monthly national 4-H club radio programs were presented through the cooperation of the National Broadcasting Co., the State agricultural colleges, and the United States Department of Agriculture.

4-H Clubs Emphasize Health

Considerable increase was noted in 1934 in the attention given to health. In Massachusetts the slogan "Protect your smile" was used in a State-wide campaign emphasizing the care of teeth. Health examinations on a county, State, and national basis serve to focus attention on the 4-H health program. In many States, the regular educational projects such as food, use of comfortable and well-fitting shoes, and similar activities are closely interwoven with the health program.

Tours and Camps Popular

Club members and leaders used tours to emphasize the results of 4-H club work in livestock, crops, or home economics. Five thousand such tours, attended by 172,000 club members, leaders, and adults, were conducted during 1934. These tours not only maintain interest in club activities and give members an opportunity to compare their results with those of others, but also inform adults as to the scope of the club program.

Club camps—community, county, or State-wide—have become a regular activity in most State programs. In 1934 the 1,712 camps drew attendance of more than 40,000 boys, 55,000 girls, and 48,000 leaders and others. Approximately 40 States were represented at the national 4-H club camp held in Washington, D. C. This camp gave outstanding club members an opportunity to learn more about their National Capital and the national club program, and provided recognition for those who have long records of club accomplishment.

Club members found the community or county achievement day a fitting climax for the 4-H activities of the year. More than 13,300 achievement days, attracting a total attendance of more than 1,388,000 persons, were reported in 1934.

94,000 Leaders Direct 4-H Clubs

More than 65,600 volunteer adult leaders supervised 4-H clubs in 1934, and 28,400 older club members acted as leaders or assistants. Throughout the country 18,000 training conferences with an attendance of 293,000 were held to provide training for local volunteer leaders.

Much of the credit for the 4-H club program's coming so successfully through a trying year was due to these busy farmers and homemakers who gave generously of their time, thought, and energies. County organizations of volunteer leaders were formed in most of the States under such names as county 4-H council or county club committee.

Not only has the program been expedited by the faithful work of the volunteer leaders, but also by various adjustments and improvements made by State and county extension supervisors.

Young Folks Develop Program

Development of programs especially suited to rural young people above club age was an outstanding achievement in 1934. Extension workers and county agents worked with 37,000 young men and women in 1,704 organized groups during 1934. This number is a 49-percent increase over the number of young people above 16 years of age in such groups in 1933. The number included 16,911 young men and 20,111 women.

These young farm people are especially interested in economic subjects and in their own personal development. In some States they are studying methods of financing through contacts with officers of local banks, methods of setting up local credit unions, and savings programs for themselves. Some groups studied principles and methods of marketing, and in certain instances fed out a carload of hogs or baby beeves, seeking to produce the meat at a minimum cost, to obtain a uniform quality, and to sell at the best market prices.

They also gave attention to forms of local government, taxation programs, the Agricultural Adjustment Administration program, national agricultural policies, and other problems relating to agriculture and general welfare. In regard to personal development, these young people want to know how to conduct themselves properly at a banquet or a dance, how to put on different types of social events, how to acquire those characteristics that will make them succeed, and how to conduct themselves as members of an organized group.

How Information Reaches Farmers

In conveying information on agriculture and home economics to rural people, extension workers make use of a multitude of methods. Cooperating with paid Federal, State, and county extension workers are 380,000 local leaders and thousand of demonstrators who demonstrate practices recommended by the Extension Service. Planning is the first step in extension work and more than 52,600 communities had extension programs planned cooperatively by agents and local committees.

Much extension information is transmitted by telephone calls and personal letter as indicated by the millions of such calls and letters reported last year. Home demonstration, club, and agricultural agents made a total of more than 2,031,000 farm or home visits in conducting extension work and received 21,400,000 office callers.

Exhibits, motion pictures, lantern slides and film strips, posters and charts, continue to be used by extension workers to illustrate talks and to convey information more clearly to the listener.

Demonstrations and Campaigns

Many farmers and homemakers adopt new practices after seeing such methods demonstrated by leaders or cooperators on their own farms. Demonstrations are among the oldest methods of extension teaching, and their numbers would total millions. County agents and extension specialists in 1934 held 425,000 meetings with a total attendance of approximately 7,700,000 persons, to demonstrate various methods. They also held 79,000 meetings to view results of demonstrations on farms or in homes, with more than 1,700,000 persons attending.

When the importance of a program warrants such emphasis it usually is conducted on the campaign basis. In a campaign, local leaders are organized and trained, and all possible methods of extension teaching are used to carry the information to the public, including news stories, radio, meetings, demonstrations, charts, film strips or motion pictures, circular letters, exhibits, and any other educational devices. The work of acquainting farmers with the various emergency programs, disseminating information on meeting drought conditions, production of food on the farm, canning, grasshopper and chinch-bug control, and similar educational activities were promoted on the campaign basis during 1934.

Meetings, Fairs, and Institutes

With the continued development of the leadership method, meetings to train local leaders or committeemen have taken a prominent place in the program. Last year county extension agents held a total of

25,635 training schools for 380,000 adult and 4-H club leaders. These leaders in turn passed the information along to other people in their communities.

More than 9,600 tours were conducted during the year to witness the work or results of work done by adult cooperators and 4-H club members. These tours drew a total attendance of more than 443,000 persons. Two million one hundred thousand persons attended 18,000 achievement days where results of the year's adult and 4-H work were exhibited and explained.

Short courses and farm- and home-week programs at the State college, encampments, conferences, and similar events gave opportunity for farm people to obtain information from extension workers. Probably the oldest method of extension teaching is the institute where specialists, agents, and trained leaders conduct regular classes and demonstrations for a period of 2 or more days.

Information Methods Prove Popular

Because of the necessity of reaching large numbers of people in recent years with a minimum expenditure of time and energy, and because of the economy and effectiveness of reaching people through editorial methods, agents and specialists are making increased use of press releases, radio talks, and bulletins.

State and county extension workers last year distributed a total of 11,800,000 bulletins on agricultural, home economics, and 4-H club subjects. In most States bulletins and circulars are prepared by specialists cooperating with the extension editor or some member of his staff who then handles the work connected with editing and printing.

County extension agents in 1934 distributed 391,000 different circular letters on various phases of agriculture or homemaking. Special canning or gardening calendars and other printed media are used widely by county agents and specialists with the help of extension agents.

Radio Regular Part of Program

Practically all States include broadcasting over college or local radio stations as a definite part of their extension program. County extension agents in 1934 gave 8,884 radio talks, a gain of 1,000 over the previous year.

The Radio Service of the Department of Agriculture syndicates agricultural, wildlife conservation, and home-economics programs to radio stations in 35 States through the offices of the State extension editors. The extension editors adapt these programs to State use and add local information. Thirty-five county agents gave regular talks over local stations, using in part the syndicated programs and adding to them local information and announcements. Plans were under way for the inauguration of similar programs in other counties.

Requests for bulletins or other information and comments from listeners indicate that radio talks provide a quick and easy means of reaching large numbers of people. Some agents have found that they can reduce the amount of time spent on certain activities by giving them adequate emphasis in their radio programs.

In addition to handling and localizing programs from the Department of Agriculture, a number of extension editors furnish county agents or local stations with special broadcasting material of a strictly State nature.

Newspapers and Magazines Cooperate

Use by newspaper and farm-magazine editors of information originating in the State extension service and county agents' offices has been an important factor in conducting the extension program. The effectiveness of news stories in conveying information to readers and in stimulating requests for bulletins and other material has led many agents to set aside a definite time each week or at more frequent intervals to prepare press releases for daily and weekly papers. Last year county agents had published 568,000 different stories relating to agriculture, home economics, and 4-H club information and activities. This number does not include routine announcement of meetings.

The work of State extension editors has increased materially during the past 2 or 3 years because of the necessity of handling large amounts of news material dealing with emergency programs in addition to regular releases supplied to the papers for many years.

The Agricultural Adjustment Administration, cooperating with the visual instruction and editorial section of the Federal Extension Service, supplies State editors with news releases on the various emergency programs. Extension editors localize these stories and adapt them to State conditions. Most extension editors have regular mimeographed news services to daily and weekly papers and in addition have the whole-hearted cooperation of the wire services in their States.

Extension editors not only write and distribute a large volume of material but help specialists and administrators to plan information programs to support the various major projects and activities. In addition to press, radio, and bulletin work, extension editors also help on the preparation of material for mimeographing, circular letters, charts, film strips, motion pictures, and other visual aids. They train county agents and local leaders in news writing and consult with them to make the county information program more effective.

Funds and Personnel

Federal funds amounting to \$6,268,096 were allotted to the 48 States, the Territories of Hawaii and Alaska, and Puerto Rico for extension work under the terms of the Smith-Lever Appropriation Acts, and \$1,480,000 was allotted under the Capper-Ketcham Act. The special appropriation of \$1,000,000 for allotment to the States primarily for extension work in economics and marketing was continued by the Congress. The direct Federal appropriation to the United States Department of Agriculture for extension work was \$814,938, of which \$684,648 was for farmers' cooperative demonstration work and motion pictures, \$66,510 for exhibits, \$12,426 for general administrative expenses, and \$51,354 for farm forestry extension.

States, counties, and other agencies expected to contribute \$11,041,632 for cooperative extension work. The total of these funds available from Federal, State, county, and local sources for cooperative extension work with the State and Territorial agricultural colleges and for motion pictures and exhibits was \$20,604,666. In addition, the Agricultural Adjustment Administration transferred \$6,009,749 to the Extension Service for educational phases of the adjustment program.

The Field Force

On June 30, 1935, the field force employed to carry on extension work numbered 6,874 persons, an increase of 325 during the year. Employed in agricultural work in the counties were 2,814 county agents, an increase of 61 during the year; 476 assistant agents, an increase of 62; and 186 Negro agents, an increase of 9. The home demonstration staff in the counties included 1,249 county home demonstration agents, an increase of 23 during the year; 51 assistant agents, an increase of 19; 9 urban agents, and 139 Negro agents, an increase of 10.

Two hundred and eleven county club agents and 34 assistants devoted their time to boys' and girls' 4-H clubs, an increase of 47 county club agents, most of whom were temporary workers, and 12 assistants. Practically all county extension agents devoted a substantial portion of their time to boys' and girls' club members. The work of the county extension agents was reinforced by 1,166 extension specialists who assisted with highly specialized problems. Fifty-five were added during the year. The administrative and supervisory staff in the States and Territories numbers 539, an increase of 27.

Personnel Changes

In accordance with paragraph 726 of the Administrative Regulations of the Department, the designation of the Office of Cooperative Extension Work was changed July 1, 1934, to the Division of Coopera-

tive Extension. C. B. Smith continued as chief, and W. H. Conway was designated as assistant to the chief.

F. C. Meier and C. E. Potter were appointed as field agents in the Eastern States and C. A. Sheffield as field agent in the Southern States to fill vacancies. Gladys Gallup, home-management specialist in the State of Washington, was appointed in the Washington, D. C., office to conduct extension studies in home demonstration work. Lita Bane was employed in cooperation with the National Council of Parent Education to assist in extension work in child care and parent education. J. L. Robinson and W. B. Silcox were employed in cooperation with the Farm Credit Administration to aid in the development of extension work in agricultural credit, succeeding C. G. Garman and L. S. Ellis, resigned. W. C. Ockey was appointed as extension economist in marketing improvement. Through the cooperation of Purdue University, W. B. Stout assisted in the educational phases of marketing in the rural rehabilitation program. J. C. Galloway performed similar service through the cooperation of Iowa State College.

Extension work lost two of its outstanding directors during the year through the sudden deaths of W. W. Long, of South Carolina, and O. B. Martin, of Texas. Director Long passed away November 12, 1934, and Director Martin June 30, 1935. Both were pioneers in extension work under Seaman A. Knapp. Mr. Martin was first employed on March 5, 1909, as assistant to Dr. Knapp in charge of boys' and girls' 4-H club work in the Southern States. In 1910 he organized the Department's first home demonstration work with women and girls. His service as director of extension work in Texas dated from 1928. Mr. Long's service in the Department dated from 1893 and his service in extension work from 1911 when he was employed as agriculturist and field agent in the Southern States. He served as director of extension work in South Carolina continuously from July 1, 1914, when the Smith-Lever Act became effective, until the day of his death 20 years later.

D. W. Watkins succeeded Mr. Long as director in South Carolina, and H. H. Williamson succeeded Mr. Martin in Texas. L. N. Duncan, director of extension work in Alabama since 1920, was appointed to the presidency of Alabama Polytechnic Institute in March 1935, but continued to serve as director pending completion of other arrangements.

W. L. Elser, who had served as director in New Mexico since 1926, resigned in June 1935 to join the Rural Resettlement Service. George R. Quesenberry succeeded him as director.

L. A. Olson, who had been director in Mississippi since 1930, resigned in January 1935 to take a position with the Tennessee Valley Authority, and was succeeded by J. R. Ricks.

When cooperative extension work was started July 1, 1934, in Puerto Rico, M. F. Barrus, extension plant pathologist of New York State College of Agriculture, was granted leave of absence for 2 years to become director of extension work in Puerto Rico.

Keeping Abreast of the Times

Although experienced extension workers devote considerable time to professional improvement and study, only 20 colleges in 1934 offered students an opportunity to take undergraduate courses directly relating to extension work as a profession. This number is a decrease of three since a similar survey in 1926. Decreased finances of State agricultural colleges and the emergency work of the past 2 years have made it necessary to postpone summer graduate courses for extension workers at several of the State colleges and universities.

In addition to attending the sessions of the Association of Land-Grant Colleges and Universities, members of the extension studies and teaching section of the Division of Cooperative Extension presented the results of extension research to the annual conference of extension workers in Arkansas and Louisiana and to a group of 40 New York home-economics extension workers who visited the Department. They took part in the conference of southern agricultural workers at Atlanta, Ga.; southern club workers at Memphis; North Carolina annual conference; 4-H short courses in Tennessee, Mississippi, and Louisiana; and conferences of Negro extension workers in Georgia, Alabama, North Carolina, Arkansas, Mississippi, and Louisiana.

Research on Extension Methods

During the year a survey of organization and conduct of Negro extension work in Louisiana was completed. This survey dealt particularly with the use of local leaders by Negro agents in developing programs of work, conducting programs, and in measuring results. A study of supervision of Negro extension work also is being made in several States.

Other studies started or completed during the year included a survey in Connecticut of the situations and interests of rural youth 16 to 25 years of age; a study of the cotton extension project in Louisiana; and a resurvey of two Arkansas counties previously surveyed in 1925 to determine the effects of both regular extension work and the Agricultural Adjustment Administration and relief programs of today. College students in a number of States who were former club members are being asked to check a list of objectives of 4-H club work developed by the National Committee of Land-Grant Colleges and the United States Department of Agriculture.

Foreign reports and other published material relating to agricultural extension, home demonstration, and boys' and girls' club work are being translated and interpreted for the benefit of extension work in the United States.

Development of projects to hold the interest of boys and girls 16 to 20 years of age was the research problem of the two Payne fund national 4-H club fellows during the past year. Mildred Ives, of North Carolina, outlined a home management project for older club girls, and Edwin Matzen, of Iowa, did the same for 4-H boys in the field of marketing. The 1935-36 fellowships were awarded to Ruth Lohmann of Minnesota, and James Potts of Texas.

Exhibits Tell the Story

Exhibits from the Department of Agriculture told the story of improved agriculture, forest protection, wildlife restoration, and home-making at 72 fairs and expositions in the United States last year. This number is an increase of 13 over the previous year. More than 7,600,000 visitors, 2,000,000 more than in 1934, attended the various fairs, all being potential viewers of the Department displays. Fifty-three organizations in 33 States cooperated with the Division of Exhibits of the Federal Extension Service in paying expenses and displaying the exhibits. Thirty-five of the displays were at State and interstate fairs.

During the year 34 new exhibits were completed, 8 were redesigned and rebuilt, and 100 were thoroughly renovated and made ready for showing during the following season. Exhibits included many subjects such as: How to Know Good Meat, Forage Crops for Drought Conditions, Erosion Control, Forest and Wildlife Protection, Agriculture as the Foundation of Industry and Commerce, Insect Control, and various economic and adjustment problems.

After the close of the Century of Progress Exposition in Chicago in 1934, the Department exhibit was returned to Washington, reviewed, and certain parts of it rebuilt for use at State fairs and other events.

Exhibits prepared for the California-Pacific International Exposition at San Diego included some of the best features of the Department exhibit at the Century of Progress. The Department exhibit at the California exposition occupied 1,989 square feet of space and represented 19 different Government functions. Joseph W. Hiscox, chief of the Division of Exhibits, was appointed by President Roosevelt to be Federal commissioner for the California-Pacific International Exposition on the recommendation of the Secretary of Agriculture.

More Movies for Education

Use of motion pictures as a method of teaching continued to increase in popularity during the year. Extension workers used films borrowed from the Division of Motion Pictures a total of 19,648 days in 1934, an increase of 33 percent over 1933. Other State and Government workers used Department films 24,889 days, and schools, organizations, and individuals, 6,651 days. This total of 51,188 days' use includes only films lent and not copies sold. Six hundred and fifty-five requests for bookings were turned down because of lack of films.

More than 2,114,000 persons attended 16,482 exhibitions of motion pictures, according to incomplete reports from only 75 percent of the borrowers. This represents an increase of more than 50 percent in the number of exhibitions and an increase in reported attendance of more than 250,000. Twenty-two new motion pictures dealing with various phases of agriculture and home economics were released during the fiscal year ended June 30, 1935, and several were revised or converted into talkies. Films of the drought of 1934 in the Middle Western States were made for file and record purposes.

At the end of the year, work was under way on 70 different projects. Of the new and old pictures, 937 copies were released during the year. The trend toward the use of 16-millimeter films instead of 35-millimeter continued in 1934. The purchase of 232 copies of Department films by outside agencies was an increase over the preceding year of more than 60 percent.

The decentralization of distribution, begun during the preceding year by the establishment of a distributing point at the Oregon Agricultural College, was developed still further by an arrangement with the Extension Service, University of California at Berkeley, whereby Department films are being distributed in the States of California, Nevada, and Arizona.

Increasing interest in educational motion pictures was noted during the year. Steps were taken looking toward the organization of an American film institute to encourage the production and use of motion pictures in education. Such an organization would aid materially in the effective development and use of educational films.

Use Visual and Editorial Aids

State, Federal, and county extension workers and other educators used more visual aids in 1934 than in any previous year, judging from the amount of work done by the Visual Instruction and Editorial Section. Twenty-five new film strips were produced during the year, and 12 old series were revised. State and county extension workers and teachers of vocational agriculture purchased 8,498 film strips in 1934—an increase of about 85 percent. Fifty-five percent of those were purchased by county agricultural agents and the remainder by teachers of vocational agriculture and others.

A marked decrease in the shipments of glass slides during 1934 was noted, with 159 series lent. This was a decrease of about 35 percent from the previous year. About four-fifths of the requests for glass lantern slides were from county agents.

The photographer of the Extension Service cooperated with 12 State extension services in taking more than 1,200 photographs illustrating the various phases of extension work and results.

Among the visual aids designed and prepared were 31 posters, 108 cloth charts, 150 graphs, both economic and pictorial, 31 line drawings, 120 miscellaneous drawings, 12 colored maps, and 48 bulletin covers. In cooperation with the Cotton Section of the Agricultural Adjustment Administration, the original drawing of a portable window display was prepared. This original was used in making plates for printing 3,000 additional exhibits by the Government Printing Office. These exhibits were distributed to all county agents and teachers of vocational agriculture in the cotton States and were used extensively in show windows and bank lobbies. Tentative lay-outs for corn and hog displays and wheat displays also were prepared.

Lay-outs for the mechanical book displayed in connection with the Extension Service exhibit at the San Diego Exposition were also prepared in the art unit. Other miscellaneous work accomplished included: Preparation of 21 drawings used on post cards for advertising new film-strip series; lettering of legends on original photographs for film-strip reproduction, and the trimming and mounting of photographs for the same purpose; designing of lay-outs for the Bureau of Home Economics exhibits; making club-camp signs; and preparation of art work for State extension divisions.

During the year 205 news stories were distributed to State extension editors in cooperation with the Agricultural Adjustment Administration. These stories provided information on various matters pertaining to Agricultural Adjustment Administration programs which State editors used as a basis for releases to daily and weekly newspapers.

The Extension Service Review, a monthly house organ issued by the Federal Extension Service, serves as a medium for exchange of ideas on methods, programs, and results of extension work throughout the country.

Appendix

Results, 1934

Funds for extension work are appropriated for fiscal years ending June 30, whereas extension agents are required to prepare their reports for calendar years. For this reason the statements of funds expended are for the fiscal year ended June 30, 1934, and the statistics of results of work done are for the calendar year ended November 30, 1934.

TABLE 1.—*Results of cooperative extension work, 1934*

SUMMARY OF EXTENSION INFLUENCE

Item	Number or value	Agents reporting
Farms in counties with extension agents ¹	5, 895, 295	2, 704
Farms on which changes in practices have definitely resulted from the agricultural extension program.....	2, 783, 733	2, 592
Farm homes in which changes in practices have definitely resulted from the home demonstration program.....	1, 000, 505	1, 912
Other homes in which changes in practices have definitely resulted from the home demonstration program.....	391, 718	1, 784
Farm homes with 4-H club members enrolled.....	503, 189	2, 544
Other homes with 4-H club members enrolled.....	125, 521	1, 996
Farm families influenced by some phase of the extension program.....	3, 566, 680	2, 713
Other families influenced by some phase of the extension program.....	638, 750	2, 211

GENERAL ACTIVITIES

County associations fostering extension work.....	4, 551	2, 244
Membership in these associations.....	778, 905	2, 234
Communities in counties.....	70, 240	2, 983
Communities with extension program.....	52, 610	2, 679
Voluntary local leaders:		
Men leaders in adult work.....	156, 939	2, 451
Women leaders in adult work.....	129, 209	2, 256
Men leaders in 4-H club work.....	23, 464	2, 232
Women leaders in 4-H club work.....	42, 085	2, 447
Older club boy leaders in 4-H club work.....	12, 279	1, 427
Older club girl leaders in 4-H club work.....	16, 123	1, 518
Paid local leaders:		
Men leaders engaged in Agricultural Adjustment Administration program or relief work.....	118, 694	2, 489
Women leaders engaged in Agricultural Adjustment Administration program or relief work.....	11, 451	1, 133
Clubs or other groups organized to carry on adult home demonstration work.....	43, 196	2, 092
Membership in such clubs or groups.....	927, 357	2, 071

¹ Census, 1930.

TABLE 1.—*Results of cooperative extension work, 1934—Continued*

	Reported by home demonstration agents		Reported by club agents ²		Reported by county agricultural agents		Total for all lines of work	
	Number or value	Agents reporting	Number or value	Agents reporting	Number or value	Agents reporting	Number or value	Agents reporting
Time devoted to Agricultural Adjustment Administration work.....	\$ 0.94	-----	\$ 2.68	-----	\$ 30.49	-----	\$ 23.39	-----
Time devoted to relief work.....	\$ 5.54	-----	\$ 1.02	-----	\$ 3.92	-----	\$ 4.15	-----
Time devoted to regular extension work.....	\$ 93.52	-----	\$ 96.30	-----	\$ 65.59	-----	\$ 72.46	-----
Time devoted to field work.....	\$ 68.61	-----	\$ 61.93	-----	\$ 47.98	-----	\$ 54.16	-----
Time devoted to office work.....	\$ 31.39	-----	\$ 38.07	-----	\$ 52.02	-----	\$ 45.84	-----
4-H clubs.....	18,912	1,250	10,890	211	29,362	2,377	55,685	2,769
Enrollment:.....								
Boys.....	14,218	254	70,768	208	288,220	2,401	366,703	2,677
Girls.....	312,658	1,263	84,105	210	161,085	1,624	549,359	2,666
Completions:.....								
Boys.....	9,036	237	54,523	206	194,445	2,267	253,426	2,540
Girls.....	215,132	1,223	67,263	204	120,944	1,537	398,375	2,573
4-H club judging teams trained.....	10,361	593	2,388	166	8,764	1,291	21,421	1,671
4-H club demonstration teams trained.....	18,777	766	3,656	188	13,405	1,150	35,870	1,725
Groups organized for extension work with rural young people above club age.....	658	255	110	63	986	372	1,704	590
Membership in such groups.....	13,771	242	3,710	56	20,746	358	37,022	478
Farm or home visits made.....	533,922	1,473	122,946	235	1,377,656	2,889	2,031,942	2,988
Different farms or homes visited.....	334,817	1,473	64,854	235	788,871	2,889	1,181,899	2,988
Office calls.....	933,541	1,409	147,626	227	20,421,598	2,894	21,489,350	2,998
Telephone calls.....	767,719	1,361	117,777	224	5,280,707	2,802	6,166,173	2,909
News articles published.....	148,800	1,383	21,348	224	399,220	2,873	568,787	2,964
Individual letters written.....	1,247,802	1,403	184,444	227	7,432,560	2,868	8,863,639	2,967
Different circular letters prepared.....	78,173	1,362	13,991	224	299,035	2,842	391,088	2,937
Bulletins distributed.....	3,625,445	1,376	400,516	219	7,795,841	2,782	11,821,802	2,906
Radio talks made.....	1,909	301	664	97	6,316	389	8,884	572
Events at which extension exhibits were shown.....	12,049	1,270	2,416	204	7,296	1,938	21,190	2,362
Adult leader-training meetings held.....	19,712	1,229	232	29	67,197	2,447	86,599	2,650
Leaders attending.....	331,363	1,227	4,884	24	985,578	2,380	1,313,912	2,446
4-H club leader-training meetings held.....	5,923	893	2,492	210	9,711	1,481	18,071	2,128
Leaders attending.....	96,574	890	43,372	210	157,964	1,465	293,295	2,117
Method-demonstration meetings held.....	280,451	1,470	22,033	192	127,854	2,488	425,413	2,763
Attendance.....	4,736,122	1,464	387,077	191	2,662,823	2,475	7,699,602	2,754
Result-demonstration meetings held.....	32,806	838	3,907	107	43,163	1,577	79,246	1,950
Attendance.....	727,623	833	135,848	106	850,030	1,571	1,703,676	1,947
Adult tours conducted.....	1,524	536	56	15	3,185	1,166	4,714	1,445
Attendance.....	106,790	532	2,908	15	164,896	1,160	271,095	1,433
4-H club tours conducted.....	801	318	1,181	169	2,982	902	4,985	1,236
Attendance.....	29,394	315	41,253	168	101,660	894	172,018	1,231
Achievement days held for adults.....	3,426	919	37	10	1,361	644	4,749	1,416
Attendance.....	430,818	918	14,103	10	389,942	640	780,661	1,414
Achievement days held for 4-H clubs.....	5,468	892	2,874	209	5,236	1,385	13,352	2,023
Attendance.....	399,274	883	291,706	204	798,962	1,375	1,388,810	2,009
Farm women's club encampments held.....	1,546	468	6	6	153	99	1,687	546
Attendance.....	45,495	458	156	6	9,539	94	54,479	534
4-H club encampments held.....	721	668	261	155	1,024	939	1,712	1,370
Attendance.....	63,558	667	23,190	152	75,216	915	144,432	1,216
Meetings held by agents.....	419,460	1,470	51,886	210	465,903	2,503	928,908	2,763
Attendance.....	11,409,147	1,464	2,053,740	210	18,660,860	2,493	31,714,908	2,754
Adult meetings held by local leaders not participated in by agents.....	126,892	1,044	1,066	19	141,444	1,771	268,958	2,192
Attendance.....	1,883,365	1,029	43,267	18	2,926,329	1,765	4,823,999	2,184
4-H club meetings held by local leaders not participated in by agents.....	66,563	833	75,989	184	97,519	1,438	243,774	2,024
Attendance.....	1,099,608	823	864,926	184	1,677,641	1,408	3,650,287	1,998

² Includes a small amount of work in counties without extension agents, reported by State club leaders.³ Percent.

TABLE 1.—*Results of cooperative extension work, 1934—Continued*

ACTIVITIES BY PROJECTS

Project or line of work	Number or value	Agents reporting
Corn:		
Days devoted to line of work by extension agents.....	99,068	2,412
Days devoted to line of work by specialists.....	5,940	1,086
Communities in which work was conducted.....	27,396	2,284
Voluntary local leaders or committeemen assisting.....	39,135	1,654
Days of assistance rendered by voluntary leaders or committeemen.....	420,860	1,497
Adult result demonstrations conducted.....	28,853	1,066
Meetings at result demonstrations.....	3,153	549
Method-demonstration meetings held.....	8,789	940
Other meetings held.....	39,870	1,432
News stories published.....	43,925	1,979
Different circular letters issued.....	30,443	1,790
Farm or home visits made.....	91,802	2,267
Office calls received.....	1,829,716	2,330
4-H club projects completed.....	36,361	1,483
Farmers following fertilizer recommendations.....	158,650	1,260
Farmers following insect-control recommendations.....	180,562	1,122
Farmers following disease-control recommendations.....	45,398	694
Farmers following marketing recommendations.....	86,884	545
Farmers assisted in using timely economic information as a basis for readjusting enterprise.....	562,736	1,254
Farms for which production-reduction contracts were signed.....	1,135,731	2,436
Acres taken out of production on such farms.....	12,325,640	2,047
Wheat:		
Days devoted to line of work by extension agents.....	45,879	1,728
Days devoted to line of work by specialists.....	3,329	729
Communities in which work was conducted.....	15,213	1,574
Voluntary local leaders or committeemen assisting.....	15,716	1,047
Days of assistance rendered by voluntary leaders or committeemen.....	64,833	917
Adult result demonstrations conducted.....	11,861	479
Meetings at result demonstrations.....	666	176
Method-demonstration meetings held.....	1,935	417
Other meetings held.....	11,620	1,054
News stories published.....	20,975	1,475
Different circular letters issued.....	21,222	1,283
Farm or home visits made.....	42,328	1,472
Office calls received.....	1,068,176	1,769
4-H club projects completed.....	737	122
Farmers following fertilizer recommendations.....	56,758	701
Farmers following insect-control recommendations.....	125,650	651
Farmers following disease-control recommendations.....	88,161	843
Farmers following marketing recommendations.....	20,538	322
Farmers assisted in using timely economic information as a basis for readjusting enterprise.....	161,332	838
Farms for which production-reduction contracts were signed.....	498,990	1,415
Acres taken out of production on such farms.....	8,498,876	1,285
Oats:		
Days devoted to line of work by extension agents.....	4,654	1,111
Days devoted to line of work by specialists.....	188	122
Communities in which work was conducted.....	6,728	934
Voluntary local leaders or committeemen assisting.....	3,304	471
Days of assistance rendered by voluntary leaders or committeemen.....	3,712	388
Adult result demonstrations conducted.....	5,876	527
Meetings at result demonstrations.....	553	207
Method-demonstration meetings held.....	1,372	284
Other meetings held.....	708	183
News stories published.....	1,878	639
Different circular letters issued.....	934	361
Farm or home visits made.....	7,818	888
Office calls received.....	56,203	1,211
4-H club projects completed.....	520	102
Farmers following fertilizer recommendations.....	35,150	568
Farmers following insect-control recommendations.....	47,229	290
Farmers following disease-control recommendations.....	80,704	797
Farmers following marketing recommendations.....	8,901	197
Farmers assisted in using timely economic information as a basis for readjusting enterprise.....	49,023	359
Rye:		
Days devoted to line of work by extension agents.....	1,065	449
Days devoted to line of work by specialists.....	64	17
Communities in which work was conducted.....	2,437	402
Voluntary local leaders or committeemen assisting.....	1,083	156
Days of assistance rendered by voluntary leaders or committeemen.....	1,345	133
Adult result demonstrations conducted.....	2,125	178
Meetings at result demonstrations.....	120	41
Method-demonstration meetings held.....	160	56
Other meetings held.....	249	54
News stories published.....	549	250
Different circular letters issued.....	205	108
Farm or home visits made.....	2,443	360

TABLE 1.—*Results of cooperative extension work, 1934—Continued*

ACTIVITIES BY PROJECTS—Continued

Project or line of work	Number or value	Agents reporting
Rye—Continued.		
Office calls received.....	18, 459	708
4-H club projects completed.....	32	8
Farmers following fertilizer recommendations.....	4, 173	168
Farmers following insect-control recommendations.....	14, 514	81
Farmers following disease-control recommendations.....	1, 851	82
Farmers following marketing recommendations.....	1, 373	65
Farmers assisted in using timely economic information as a basis for readjusting enterprise.....	12, 606	139
Barley:		
Days devoted to line of work by extension agents.....	1, 930	656
Days devoted to line of work by specialists.....	197	109
Communities in which work was conducted.....	2, 932	510
Voluntary local leaders or committeemen assisting.....	1, 437	246
Days of assistance rendered by voluntary leaders or committeemen.....	1, 763	200
Adult result demonstrations conducted.....	1, 662	261
Meetings at result demonstrations.....	121	53
Method-demonstration meetings held.....	218	84
Other meetings held.....	298	102
News stories published.....	1, 041	364
Different circular letters issued.....	371	185
Farm or home visits made.....	3, 835	471
Office calls received.....	28, 220	748
4-H club projects completed.....	210	48
Farmers following fertilizer recommendations.....	11, 036	249
Farmers following insect-control recommendations.....	28, 544	149
Farmers following disease-control recommendations.....	20, 760	321
Farmers following marketing recommendations.....	6, 326	118
Farmers assisted in using timely economic information as a basis for readjusting enterprise.....	17, 698	196
Other cereals:		
Days devoted to line of work by extension agents.....	2, 784	483
Days devoted to line of work by specialists.....	226	89
Communities in which work was conducted.....	2, 398	319
Voluntary local leaders or committeemen assisting.....	1, 601	187
Days of assistance rendered by voluntary leaders or committeemen.....	5, 393	150
Adult result demonstrations conducted.....	1, 186	147
Meetings at result demonstrations.....	158	49
Method-demonstration meetings held.....	375	84
Other meetings held.....	589	105
News stories published.....	3, 230	270
Different circular letters issued.....	888	164
Farm or home visits made.....	3, 960	308
Office calls received.....	65, 472	500
4-H club projects completed.....	1, 323	111
Farmers following fertilizer recommendations.....	1, 928	87
Farmers following insect-control recommendations.....	15, 497	97
Farmers following disease-control recommendations.....	10, 943	106
Farmers following marketing recommendations.....	4, 236	48
Farmers assisted in using timely economic information as a basis for readjusting enterprise.....	15, 615	123
Alfalfa:		
Days devoted to line of work by extension agents.....	8, 800	1, 551
Days devoted to line of work by specialists.....	774	474
Communities in which work was conducted.....	9, 425	1, 298
Voluntary local leaders or committeemen assisting.....	5, 184	700
Days of assistance rendered by voluntary leaders or committeemen.....	5, 828	566
Adult result demonstrations conducted.....	5, 627	743
Meetings at result demonstrations.....	747	282
Method-demonstration meetings held.....	1, 169	335
Other meetings held.....	1, 314	394
News stories published.....	4, 819	1, 095
Different circular letters issued.....	2, 161	593
Farm or home visits made.....	21, 478	1, 443
Office calls received.....	86, 699	1, 644
4-H club projects completed.....	263	75
Farmers following fertilizer recommendations.....	53, 358	936
Farmers following insect-control recommendations.....	19, 479	332
Farmers following disease-control recommendations.....	4, 960	191
Farmers following marketing recommendations.....	8, 136	298
Farmers assisted in using timely economic information as a basis for readjusting enterprise.....	44, 877	457
Sweetclover:		
Days devoted to line of work by extension agents.....	1, 809	722
Days devoted to line of work by specialists.....	170	117
Communities in which work was conducted.....	3, 735	591
Voluntary local leaders or committeemen assisting.....	1, 848	301
Days of assistance rendered by voluntary leaders or committeemen.....	2, 147	221
Adult result demonstrations conducted.....	1, 420	247
Meetings at result demonstrations.....	158	74
Method-demonstration meetings held.....	377	91

TABLE 1.—*Results of cooperative extension work, 1934—Continued*

ACTIVITIES BY PROJECTS—Continued

Project or line of work	Number or value	Agents reporting
Sweetclover—Continued.		
Other meetings held.....	446	122
News stories published.....	1,386	427
Different circular letters issued.....	455	179
Farm or home visits made.....	4,513	617
Office calls received.....	27,347	896
4-H club projects completed.....	7	6
Farmers following fertilizer recommendations.....	11,559	300
Farmers following insect-control recommendations.....	3,731	52
Farmers following disease-control recommendations.....	131	22
Farmers following marketing recommendations.....	923	68
Farmers assisted in using timely economic information as a basis for readjusting enterprise.....	11,690	168
Other clovers:		
Days devoted to line of work by extension agents.....	2,929	757
Days devoted to line of work by specialists.....	219	144
Communities in which work was conducted.....	4,757	626
Voluntary local leaders or committeemen assisting.....	2,790	327
Days of assistance rendered by voluntary leaders or committeemen.....	2,794	241
Adult result demonstrations conducted.....	3,709	321
Meetings at result demonstrations.....	325	115
Method-demonstration meetings held.....	566	138
Other meetings held.....	475	150
News stories published.....	1,581	458
Different circular letters issued.....	678	246
Farm or home visits made.....	7,993	620
Office calls received.....	32,936	885
4-H club projects completed.....	50	7
Farmers following fertilizer recommendations.....	18,237	366
Farmers following insect-control recommendations.....	3,604	42
Farmers following disease-control recommendations.....	567	39
Farmers following marketing recommendations.....	2,449	95
Farmers assisted in using timely economic information as a basis for readjusting enterprise.....	15,852	184
Vetch:		
Days devoted to line of work by extension agents.....	3,560	608
Days devoted to line of work by specialists.....	117	62
Communities in which work was conducted.....	4,866	608
Voluntary local leaders or committeemen assisting.....	3,036	311
Days of assistance rendered by voluntary leaders or committeemen.....	5,198	249
Adult result demonstrations conducted.....	14,615	400
Meetings at result demonstrations.....	882	210
Method-demonstration meetings held.....	1,800	249
Other meetings held.....	691	149
News stories published.....	1,547	450
Different circular letters issued.....	1,059	274
Farm or home visits made.....	9,921	555
Office calls received.....	66,827	783
4-H club projects completed.....	1,395	30
Farmers following fertilizer recommendations.....	17,861	232
Farmers following insect-control recommendations.....	1,616	46
Farmers following disease-control recommendations.....	1,633	26
Farmers following marketing recommendations.....	3,015	54
Farmers assisted in using timely economic information as a basis for readjusting enterprise.....	12,590	149
Lespedeza:		
Days devoted to line of work by extension agents.....	5,622	1,010
Days devoted to line of work by specialists.....	255	149
Communities in which work was conducted.....	7,413	920
Voluntary local leaders or committeemen assisting.....	4,492	474
Days of assistance rendered by voluntary leaders or committeemen.....	4,724	388
Adult result demonstrations conducted.....	15,036	598
Meetings at result demonstrations.....	687	254
Method-demonstration meetings held.....	1,171	264
Other meetings held.....	796	210
News stories published.....	2,844	747
Different circular letters issued.....	1,680	378
Farm or home visits made.....	16,251	922
Office calls received.....	84,098	1,188
4-H club projects completed.....	252	41
Farmers following fertilizer recommendations.....	9,464	249
Farmers following insect-control recommendations.....	152	32
Farmers following disease-control recommendations.....	393	29
Farmers following marketing recommendations.....	5,623	151
Farmers assisted in using timely economic information as a basis for readjusting enterprise.....	25,750	279
Pastures:		
Days devoted to line of work by extension agents.....	9,785	1,582
Days devoted to line of work by specialists.....	934	382
Communities in which work was conducted.....	10,490	1,352
Voluntary local leaders or committeemen assisting.....	5,913	663

TABLE 1.—*Results of cooperative extension work, 1934*—Continued

ACTIVITIES BY PROJECTS—Continued

Project or line of work	Number or value	Agents reporting
Pastures—Continued.		
Days of assistance rendered by voluntary leaders or committeemen	7, 807	558
Adult result demonstrations conducted	9, 590	862
Meetings at result demonstrations	1, 379	378
Method-demonstration meetings held	1, 764	357
Other meetings held	1, 521	389
News stories published	4, 961	1, 114
Different circular letters issued	2, 706	652
Farm or home visits made	19, 787	1, 365
Office calls received	92, 327	1, 619
4-H club projects completed	216	31
Farmers following fertilizer recommendations	17, 111	657
Farmers following insect-control recommendations	10, 211	88
Farmers following disease-control recommendations	4, 478	29
Farmers following marketing recommendations	1, 194	27
Farmers assisted in using timely economic information as a basis for readjusting enterprise	35, 639	348
Soybeans:		
Days devoted to line of work by extension agents	5, 263	1, 221
Days devoted to line of work by specialists	246	145
Communities in which work was conducted	8, 747	1, 066
Voluntary local leaders or committeemen assisting	4, 559	586
Days of assistance rendered by voluntary leaders or committeemen	4, 260	429
Adult result demonstrations conducted	10, 513	589
Meetings at result demonstrations	629	242
Method-demonstration meetings held	1, 215	275
Other meetings held	1, 204	287
News stories published	2, 984	801
Different circular letters issued	1, 971	528
Farm or home visits made	18, 321	1, 054
Office calls received	81, 957	1, 234
4-H club projects completed	877	134
Farmers following fertilizer recommendations	18, 342	458
Farmers following insect-control recommendations	3, 374	86
Farmers following disease-control recommendations	947	49
Farmers following marketing recommendations	10, 194	253
Farmers assisted in using timely economic information as a basis for readjusting enterprise	58, 681	398
Cowpeas and field peas:		
Days devoted to line of work by extension agents	2, 929	686
Days devoted to line of work by specialists	102	40
Communities in which work was conducted	5, 598	594
Voluntary local leaders or committeemen assisting	3, 400	279
Days of assistance rendered by voluntary leaders or committeemen	3, 178	243
Adult result demonstrations conducted	9, 043	340
Meetings at result demonstrations	721	146
Method-demonstration meetings held	1, 148	191
Other meetings held	556	126
News stories published	915	304
Different circular letters issued	406	182
Farm or home visits made	7, 577	521
Office calls received	32, 626	755
4-H club projects completed	999	90
Farmers following fertilizer recommendations	5, 522	187
Farmers following insect-control recommendations	4, 566	117
Farmers following disease-control recommendations	2, 020	62
Farmers following marketing recommendations	4, 415	146
Farmers assisted in using timely economic information as a basis for readjusting enterprise	25, 325	208
Velvetbeans:		
Days devoted to line of work by extension agents	688	190
Days devoted to line of work by specialists	6	2
Communities in which work was conducted	1, 441	182
Voluntary local leaders or committeemen assisting	765	82
Days of assistance rendered by voluntary leaders or committeemen	804	68
Adult result demonstrations conducted	2, 476	117
Meetings at result demonstrations	232	58
Method-demonstration meetings held	361	65
Other meetings held	125	41
News stories published	128	61
Different circular letters issued	187	46
Farm or home visits made	1, 861	136
Office calls received	5, 979	279
4-H club projects completed	196	23
Farmers following fertilizer recommendations	3, 252	48
Farmers following insect-control recommendations	2, 356	18
Farmers following disease-control recommendations	1, 466	16
Farmers following marketing recommendations	2, 354	35
Farmers assisted in using timely economic information as a basis for readjusting enterprise	4, 395	48

TABLE 1.—*Results of cooperative extension work, 1934—Continued*

ACTIVITIES BY PROJECTS—Continued

Project or line of work	Number or value	Agents reporting
Field beans:		
Days devoted to line of work by extension agents.....	999	210
Days devoted to line of work by specialists.....	102	41
Communities in which work was conducted.....	1, 253	198
Voluntary local leaders or committeemen assisting.....	698	106
Days of assistance rendered by voluntary leaders or committeemen.....	847	104
Adult result demonstrations conducted.....	1, 071	109
Meetings at result demonstrations.....	133	46
Method-demonstration meetings held.....	259	62
Other meetings held.....	258	70
News stories published.....	354	115
Different circular letters issued.....	294	80
Farm or home visits made.....	2, 833	182
Office calls received.....	9, 591	258
4-H club projects completed.....	567	67
Farmers following fertilizer recommendations.....	1, 062	44
Farmers following insect-control recommendations.....	1, 905	59
Farmers following disease-control recommendations.....	516	31
Farmers following marketing recommendations.....	1, 013	36
Farmers assisted in using timely economic information as a basis for readjusting enterprise.....	1, 519	39
Peanuts:		
Days devoted to line of work by extension agents.....	2, 548	467
Days devoted to line of work by specialists.....	71	25
Communities in which work was conducted.....	3, 375	401
Voluntary local leaders or committeemen assisting.....	2, 146	192
Days of assistance rendered by voluntary leaders or committeemen.....	1, 690	175
Adult result demonstrations conducted.....	3, 573	196
Meetings at result demonstrations.....	452	103
Method-demonstration meetings held.....	857	146
Other meetings held.....	508	115
News stories published.....	588	211
Different circular letters issued.....	543	169
Farm or home visits made.....	6, 057	342
Office calls received.....	33, 252	496
4-H club projects completed.....	4, 861	431
Farmers following fertilizer recommendations.....	23, 054	168
Farmers following insect-control recommendations.....	636	27
Farmers following disease-control recommendations.....	1, 191	36
Farmers following marketing recommendations.....	8, 032	138
Farmers assisted in using timely economic information as a basis for readjusting enterprise.....	12, 759	146
Other legumes:		
Days devoted to line of work by extension agents.....	4, 002	678
Days devoted to line of work by specialists.....	245	112
Communities in which work was conducted.....	4, 544	527
Voluntary local leaders or committeemen assisting.....	2, 373	263
Days of assistance rendered by voluntary leaders or committeemen.....	2, 830	218
Adult result demonstrations conducted.....	5, 016	325
Meetings at result demonstrations.....	521	134
Method-demonstration meetings held.....	1, 053	160
Other meetings held.....	621	170
News stories published.....	2, 298	477
Different circular letters issued.....	868	315
Farm or home visits made.....	9, 079	536
Office calls received.....	50, 434	720
4-H club projects completed.....	888	77
Farmers following fertilizer recommendations.....	9, 074	214
Farmers following insect-control recommendations.....	3, 321	59
Farmers following disease-control recommendations.....	1, 419	42
Farmers following marketing recommendations.....	4, 650	84
Farmers assisted in using timely economic information as a basis for readjusting enterprise.....	23, 558	157
Potatoes:		
Days devoted to line of work by extension agents.....	13, 378	1, 394
Days devoted to line of work by specialists.....	1, 920	481
Communities in which work was conducted.....	9, 871	1, 275
Voluntary local leaders or committeemen assisting.....	6, 664	810
Days of assistance rendered by voluntary leaders or committeemen.....	9, 485	639
Adult result demonstrations conducted.....	9, 244	670
Meetings at result demonstrations.....	1, 342	338
Method-demonstration meetings held.....	3, 441	564
Other meetings held.....	3, 980	550
News stories published.....	5, 591	939
Different circular letters issued.....	4, 313	727
Farm or home visits made.....	37, 798	1, 254
Office calls received.....	102, 755	1, 499
4-H club projects completed.....	18, 593	1, 026
Farmers following fertilizer recommendations.....	62, 846	1, 002
Farmers following insect-control recommendations.....	92, 840	1, 013

TABLE 1.—*Results of cooperative extension work, 1934—Continued*

ACTIVITIES BY PROJECTS—Continued

Project or line of work	Number or value	Agents reporting
Potatoes—Continued.		
Farmers following disease-control recommendations.....	64,888	1,046
Farmers following marketing recommendations.....	25,607	586
Farmers assisted in using timely economic information as a basis for readjusting enterprise.....	35,033	522
Sweet potatoes:		
Days devoted to line of work by extension agents.....	4,207	651
Days devoted to line of work by specialists.....	156	65
Communities in which work was conducted.....	5,262	583
Voluntary local leaders or committeemen assisting.....	3,294	302
Days of assistance rendered by voluntary leaders or committeemen.....	3,584	237
Adult result demonstrations conducted.....	6,112	333
Meetings at result demonstrations.....	753	163
Method-demonstration meetings held.....	1,833	275
Other meetings held.....	816	145
News stories published.....	922	321
Different circular letters issued.....	703	235
Farm or home visits made.....	9,387	544
Office calls received.....	48,457	701
4-H club projects completed.....	4,577	410
Farmers following fertilizer recommendations.....	27,617	423
Farmers following insect-control recommendations.....	5,224	144
Farmers following disease-control recommendations.....	21,513	386
Farmers following marketing recommendations.....	17,898	290
Farmers assisted in using timely economic information as a basis for readjusting enterprise.....	22,055	188
Cotton:		
Days devoted to line of work by extension agents.....	126,387	1,052
Days devoted to line of work by specialists.....	2,246	313
Communities in which work was conducted.....	17,258	988
Voluntary local leaders or committeemen assisting.....	25,224	745
Days of assistance rendered by voluntary leaders or committeemen.....	494,212	643
Adult result demonstrations conducted.....	49,236	564
Meetings at result demonstrations.....	21,981	322
Method-demonstration meetings held.....	6,973	407
Other meetings held.....	23,947	746
News stories published.....	27,681	915
Different circular letters issued.....	49,373	907
Farm or home visits made.....	133,552	964
Office calls received.....	5,853,306	1,028
4-H club projects completed.....	13,197	637
Farmers following fertilizer recommendations.....	180,406	597
Farmers following insect-control recommendations.....	63,247	505
Farmers following disease-control recommendations.....	37,078	287
Farmers following marketing recommendations.....	289,348	511
Farmers assisted in using timely economic information as a basis for readjusting enterprise.....	627,339	583
Farms for which production-reduction contracts were signed.....	1,050,902	968
Acres taken out of production on such farms.....	13,073,618	929
Tobacco:		
Days devoted to line of work by extension agents.....	33,551	553
Days devoted to line of work by specialists.....	1,355	227
Communities in which work was conducted.....	4,156	453
Voluntary local leaders or committeemen assisting.....	7,101	358
Days of assistance rendered by voluntary leaders or committeemen.....	26,194	299
Adult result demonstrations conducted.....	6,721	177
Meetings at result demonstrations.....	334	77
Method-demonstration meetings held.....	1,567	155
Other meetings held.....	7,855	345
News stories published.....	8,029	423
Different circular letters issued.....	6,742	410
Farm or home visits made.....	28,639	461
Office calls received.....	1,042,812	545
4-H club projects completed.....	4,145	182
Farmers following fertilizer recommendations.....	36,121	298
Farmers following insect-control recommendations.....	34,351	259
Farmers following disease-control recommendations.....	19,067	202
Farmers following marketing recommendations.....	53,805	181
Farmers assisted in using timely economic information as a basis for readjusting enterprise.....	82,173	243
Farms for which production-reduction contracts were signed.....	281,013	507
Acres taken out of production on such farms.....	757,660	483
Other special crops:		
Days devoted to line of work by extension agents.....	4,269	405
Days devoted to line of work by specialists.....	428	112
Communities in which work was conducted.....	2,377	315
Voluntary local leaders or committeemen assisting.....	1,436	201
Days of assistance rendered by voluntary leaders or committeemen.....	2,861	160
Adult result demonstrations conducted.....	1,590	151
Meetings at result demonstrations.....	404	76
Method-demonstration meetings held.....	1,010	105

TABLE 1.—*Results of cooperative extension work, 1934—Continued*

ACTIVITIES BY PROJECTS—Continued

Project or line of work	Number or value	Agents reporting
Other special crops—Continued.		
Other meetings held.....	1,000	187
News stories published.....	1,457	252
Different circular letters issued.....	840	194
Farm or home visits made.....	8,329	328
Office calls received.....	55,658	432
4-H club projects completed.....	1,119	129
Farmers following fertilizer recommendations.....	11,542	180
Farmers following insect-control recommendations.....	6,586	116
Farmers following disease-control recommendations.....	7,124	106
Farmers following marketing recommendations.....	5,277	99
Farmers assisted in using timely economic information as a basis for readjusting enterprise.....	10,292	85
Home gardens:		
Days devoted to line of work by extension agents.....	39,063	1,657
Days devoted to line of work by specialists.....	1,403	589
Communities in which work was conducted.....	29,957	1,895
Voluntary local leaders or committeemen assisting.....	23,772	1,309
Days of assistance rendered by voluntary leaders or committeemen.....	44,580	1,112
Adult result demonstrations conducted.....	99,408	935
Meetings at result demonstrations.....	7,967	655
Method-demonstration meetings held.....	25,274	1,252
Other meetings held.....	13,735	1,074
News stories published.....	14,581	1,715
Different circular letters issued.....	9,446	1,405
Farm or home visits made.....	123,827	1,919
Office calls received.....	208,786	2,140
4-H club projects completed.....	109,476	1,226
Farms or homes where fertilizer recommendations were followed.....	174,077	1,226
Farms or homes where insect-control recommendations were followed.....	271,735	1,672
Farms or homes where disease-control recommendations were followed.....	150,817	1,273
Farms or homes where marketing recommendations were followed.....	18,682	532
Farms or homes where assistance was given in using timely economic information as a basis for readjusting enterprise.....	90,332	490
Market gardening, truck, and canning crops:		
Days devoted to line of work by extension agents.....	14,577	1,124
Days devoted to line of work by specialists.....	1,524	410
Communities in which work was conducted.....	7,532	1,011
Voluntary local leaders or committeemen assisting.....	6,066	605
Days of assistance rendered by voluntary leaders or committeemen.....	8,595	487
Adult result demonstrations conducted.....	12,327	517
Meetings at result demonstrations.....	1,900	311
Method-demonstration meetings held.....	4,286	481
Other meetings held.....	3,099	530
News stories published.....	5,733	813
Different circular letters issued.....	3,548	590
Farm or home visits made.....	36,217	1,051
Office calls received.....	101,018	1,322
4-H club projects completed.....	9,698	242
Farms or homes where fertilizer recommendations were followed.....	39,244	672
Farms or homes where insect-control recommendations were followed.....	50,510	774
Farms or homes where disease-control recommendations were followed.....	35,525	653
Farms or homes where marketing recommendations were followed.....	27,264	551
Farms or homes where assistance was given in using timely economic information as a basis for readjusting enterprise.....	30,986	411
Beautification of home grounds:		
Days devoted to line of work by extension agents.....	16,706	936
Days devoted to line of work by specialists.....	1,484	573
Communities in which work was conducted.....	14,358	1,385
Voluntary local leaders or committeemen assisting.....	12,486	858
Days of assistance rendered by voluntary leaders or committeemen.....	14,190	730
Adult result demonstrations conducted.....	27,143	776
Meetings at result demonstrations.....	3,937	505
Method-demonstration meetings held.....	10,717	966
Other meetings held.....	4,851	622
News stories published.....	9,773	1,070
Different circular letters issued.....	4,537	770
Farm or home visits made.....	37,765	1,399
Office calls received.....	62,778	1,505
4-H club projects completed.....	37,052	589
Farms or homes where fertilizer recommendations were followed.....	13,820	464
Farms or homes where insect-control recommendations were followed.....	22,618	596
Farms or homes where disease-control recommendations were followed.....	15,204	459
Farms or homes where assistance was given in using timely economic information as a basis for readjusting enterprise.....	7,939	127
Homes where recommendations were followed as to establishment or care of lawn.....	39,826	1,352
Homes where recommendations were followed regarding planting of shrubbery and trees.....	64,648	1,438

TABLE 1.—*Results of cooperative extension work, 1934—Continued*

ACTIVITIES BY PROJECTS—Continued

Project or line of work	Number or value	Agents reporting
Beautification of home grounds—Continued.		
Homes where recommendations were followed as to treatment of walks, drives, or fences.....	27,992	991
Homes where recommendations were followed as to improving appearance of exterior of house and outbuildings.....	35,160	991
Tree fruits:		
Days devoted to line of work by extension agents.....	18,993	1,513
Days devoted to line of work by specialists.....	3,428	659
Communities in which work was conducted.....	10,253	1,351
Voluntary local leaders or committeemen assisting.....	6,517	689
Days of assistance rendered by voluntary leaders or committeemen.....	8,066	570
Adult result demonstrations conducted.....	16,671	738
Meetings at result demonstrations.....	1,702	381
Method-demonstration meetings held.....	5,472	929
Other meetings held.....	2,997	546
News stories published.....	7,991	1,069
Different circular letters issued.....	7,401	839
Farm or home visits made.....	52,422	1,457
Office calls received.....	121,540	1,666
4-H club projects completed.....	3,622	130
Farms or homes where fertilizer recommendations were followed.....	29,725	764
Farms or homes where insect-control recommendations were followed.....	71,380	1,176
Farms or homes where disease-control recommendations were followed.....	60,950	1,071
Farms or homes where marketing recommendations were followed.....	13,958	430
Farms or homes where assistance was given in using timely economic information as a basis for readjusting enterprise.....	22,320	358
Bush and small fruits:		
Days devoted to line of work by extension agents.....	4,294	759
Days devoted to line of work by specialists.....	480	252
Communities in which work was conducted.....	4,834	759
Voluntary local leaders or committeemen assisting.....	3,046	367
Days of assistance rendered by voluntary leaders or committeemen.....	2,260	298
Adult result demonstrations conducted.....	7,025	370
Meetings at result demonstrations.....	609	166
Method-demonstrations meetings held.....	1,671	307
Other meetings held.....	1,243	258
News stories published.....	1,971	490
Different circular letters issued.....	1,367	318
Farm or home visits made.....	12,288	781
Office calls received.....	36,138	968
4-H club projects completed.....	4,496	171
Farms or homes where fertilizer recommendations were followed.....	11,071	399
Farms or homes where insect-control recommendations were followed.....	17,635	463
Farms or homes where disease-control recommendations were followed.....	14,632	455
Farms or homes where marketing recommendations were followed.....	8,457	227
Farms or homes where assistance was given in using timely economic information as a basis for readjusting enterprise.....	9,538	187
Grapes:		
Days devoted to line of work by extension agents.....	2,114	554
Days devoted to line of work by specialists.....	196	101
Communities in which work was conducted.....	2,836	546
Voluntary local leaders or committeemen assisting.....	1,476	218
Days of assistance rendered by voluntary leaders or committeemen.....	1,137	172
Adult result demonstrations conducted.....	3,184	269
Meetings at result demonstrations.....	303	94
Method-demonstration meetings held.....	926	265
Other meetings held.....	329	106
News stories published.....	953	276
Different circular letters issued.....	479	155
Farm or home visits made.....	5,076	547
Office calls received.....	16,606	739
4-H club projects completed.....	1,020	44
Farms or homes where fertilizer recommendations were followed.....	4,482	240
Farms or homes where insect-control recommendations were followed.....	13,307	404
Farms or homes where disease-control recommendations were followed.....	8,259	386
Farms or homes where marketing recommendations were followed.....	2,829	135
Farms or homes where assistance was given in using timely economic information as a basis for readjusting enterprise.....	4,995	126
Forestry:		
Days devoted to line of work by extension agents.....	6,358	1,094
Days devoted to line of work by specialists.....	1,452	597
Communities in which work was conducted.....	6,234	971
Voluntary local leaders or committeemen assisting.....	3,918	583
Days of assistance rendered by voluntary leaders or committeemen.....	6,434	470
Adult result demonstrations conducted.....	3,728	454
Meetings at result demonstrations.....	1,512	213
Method-demonstration meetings held.....	3,382	433
Other meetings held.....	1,972	346
News stories published.....	3,475	831
Different circular letters issued.....	1,621	504

TABLE 1.—Results of cooperative extension work, 1934—Continued

ACTIVITIES BY PROJECTS—Continued

Project or line of work	Number or value	Agents re- porting
Forestry—Continued.		
Farm or home visits made.....	12, 611	927
Office calls received.....	39, 601	1, 237
4-H club projects completed.....	10, 340	337
Farms on which new areas were reforested by planting with small trees.....	8, 929	506
Acres involved.....	40, 560	472
Farmers planting windbreaks or shelterbelts.....	8, 557	443
Farmers planting trees for erosion control.....	5, 229	246
Farmers making improved thinnings and weedings.....	5, 237	393
Farmers practicing selection cutting.....	9, 681	352
Farmers pruning forest trees.....	4, 183	229
Farmers cooperating in prevention of forest fires.....	57, 749	370
Farmers adopting improved practices in production of naval stores.....	2, 914	49
Farmers adopting improved practices in production of maple sugar and sirup.....	1, 798	111
Farmers assisted in timber estimating and appraisal.....	1, 127	210
Farmers following wood-preservation recommendations.....	7, 027	268
Farmers following recommendations in the marketing of forest products.....	2, 895	233
Agricultural engineering:		
Days devoted to line of work by extension agents.....	19, 492	1, 772
Days devoted to line of work by specialists.....	2, 722	702
Communities in which work was conducted.....	12, 334	1, 501
Voluntary local leaders or committeemen assisting.....	8, 137	901
Days of assistance rendered by voluntary leaders or committeemen.....	20, 231	853
Adult result demonstrations conducted.....	12, 930	815
Meetings at result demonstrations.....	3, 473	492
Method-demonstration meetings held.....	9, 260	992
Other meetings held.....	3, 927	648
News stories published.....	6, 662	1, 303
Different circular letters issued.....	3, 845	910
Farm or home visits made.....	32, 213	1, 706
Office calls received.....	157, 043	1, 812
4-H club projects completed.....	5, 859	257
Farmers terracing and otherwise controlling erosion.....	40, 387	1, 160
Value of resulting service or savings.....	\$5, 653, 867	988
Farmers following improved drainage practices.....	6, 822	705
Value of resulting service or savings.....	\$789, 587	523
Farmers following improved irrigation practices.....	6, 251	427
Value of resulting service or savings.....	\$893, 152	303
Farmers following land-clearing practices.....	4, 258	248
Value of resulting service or savings.....	\$164, 022	204
Farmers using better types of machines.....	7, 619	412
Value of resulting service or savings.....	\$215, 109	285
Farmers following recommendations in the maintenance and repair of machines.....	18, 610	486
Value of resulting service or savings.....	\$155, 650	348
Farmers following recommendations in the efficient use of machinery.....	9, 308	273
Value of resulting service or savings.....	\$175, 055	167
Farmers constructing buildings according to recommendations.....	31, 076	1, 458
Value of resulting service or savings.....	\$1, 344, 381	799
Farmers having buildings remodeled, repaired, or painted.....	24, 465	1, 191
Value of resulting service or savings.....	\$513, 479	681
Farmers installing electrification units.....	2, 371	281
Value of resulting service or savings.....	\$75, 305	136
Homes in which improved equipment was used.....	20, 616	522
Value of resulting service or savings.....	\$278, 421	291
Dwellings constructed according to plans furnished.....	1, 978	385
Dwellings remodeled according to plans furnished.....	5, 987	469
Sewage systems installed.....	3, 917	547
Water systems installed.....	3, 156	543
Heating systems installed.....	634	134
Lighting systems installed.....	2, 213	312
Home appliances and machines installed.....	12, 091	270
Dairy buildings erected or remodeled.....	3, 974	696
Silos erected.....	14, 012	736
Hog houses erected or remodeled.....	3, 944	512
Poultry houses erected or remodeled.....	15, 921	1, 355
Storage structures erected or remodeled.....	6, 646	636
Other farm buildings erected or remodeled.....	10, 743	586
Poultry:		
Days devoted to line of work by extension agents.....	42, 009	681
Days devoted to line of work by specialists.....	4, 945	1, 215
Communities in which work was conducted.....	26, 342	2, 814
Voluntary local leaders or committeemen assisting.....	19, 609	1, 653
Days of assistance rendered by voluntary leaders or committeemen.....	25, 162	1, 369
Adult result demonstrations conducted.....	31, 328	1, 201
Meetings at result demonstrations.....	7, 271	696
Method-demonstration meetings held.....	20, 465	1, 729
Other meetings held.....	10, 142	1, 336
News stories published.....	19, 261	1, 972
Different circular letters issued.....	14, 854	1, 660
Farm or home visits made.....	109, 681	2, 449

TABLE 1.—*Results of cooperative extension work, 1934—Continued*
ACTIVITIES BY PROJECTS—Continued

Project or line of work	Number or value	Agents reporting
Poultry—Continued.		
Office calls received.....	257, 267	2, 486
4-H club projects completed.....	64, 525	1, 622
Families following an organized improved breeding plan as recommended.....	49, 800	1, 379
Families following recommendations in purchasing baby chicks.....	80, 264	1, 693
Families following recommendations in chick rearing.....	159, 360	2, 001
Families following production-feeding recommendations.....	158, 313	1, 956
Families following sanitation recommendations in disease and parasite control.....	153, 078	2, 106
Families improving poultry-house equipment according to recommendations.....	49, 541	1, 916
Families following marketing recommendations.....	67, 420	1, 197
Families assisted in using timely economic information as a basis for readjusting enterprise.....	73, 061	1, 064
Dairy cattle:		
Days devoted to line of work by extension agents.....	45, 407	2, 221
Days devoted to line of work by specialists.....	6, 644	1, 121
Communities in which work was conducted.....	22, 454	2, 049
Voluntary local leaders or committeemen assisting.....	19, 825	1, 412
Days of assistance rendered by voluntary leaders or committeemen.....	39, 859	1, 197
Adult result demonstrations conducted.....	16, 324	772
Meetings at result demonstrations.....	2, 024	400
Method-demonstration meetings held.....	9, 693	1, 052
Other meetings held.....	13, 533	1, 399
News stories published.....	21, 893	1, 831
Different circular letters issued.....	17, 829	1, 551
Farm or home visits made.....	101, 191	2, 062
Office calls received.....	512, 232	2, 260
4-H club projects completed.....	53, 923	1, 541
Farmers assisted in obtaining purebred sires.....	10, 036	1, 432
Farmers assisted in obtaining high-grade or purebred females.....	12, 794	1, 041
Bull circles or clubs organized or assisted.....	593	221
Members in such circles or clubs.....	5, 180	205
Herd-improvement associations organized or assisted.....	⁴ 1, 076	725
Members in such associations.....	22, 081	705
Farmers not in associations keeping performance records of animals.....	14, 139	706
Families assisted in home butchering, meat cutting, and curing.....	23, 639	279
Families assisted in butter and cheese making.....	33, 551	584
Farmers following parasite-control recommendations.....	35, 880	576
Farmers following disease-control recommendations.....	188, 174	1, 036
Farmers following marketing recommendations.....	66, 599	604
Farmers assisted in using timely economic information as a basis for readjusting enterprise.....	116, 819	795
Beef cattle:		
Days devoted to line of work by extension agents.....	32, 841	1, 905
Days devoted to line of work by specialists.....	2, 776	700
Communities in which work was conducted.....	16, 081	1, 603
Voluntary local leaders or committeemen assisting.....	10, 644	1, 053
Days of assistance rendered by voluntary leaders or committeemen.....	47, 965	860
Adult result demonstrations conducted.....	7, 764	465
Meetings at result demonstrations.....	1, 372	253
Method-demonstration meetings held.....	7, 523	796
Other meetings held.....	6, 810	968
News stories published.....	12, 064	1, 448
Different circular letters issued.....	10, 401	1, 221
Farm or home visits made.....	65, 297	1, 727
Office calls received.....	693, 022	1, 794
4-H club projects completed.....	15, 297	1, 116
Farmers assisted in obtaining purebred sires.....	6, 480	1, 065
Farmers assisted in obtaining high-grade or purebred females.....	5, 455	616
Bull circles or clubs organized or assisted.....	106	50
Members in such circles or clubs.....	791	37
Herd-improvement associations organized or assisted.....	170	59
Members in such associations.....	4, 187	56
Farmers not in associations keeping performance records of animals.....	2, 163	148
Families assisted in home butchering, meat cutting, and curing.....	25, 378	621
Farmers following parasite-control recommendations.....	32, 435	441
Farmers following disease-control recommendations.....	68, 716	623
Farmers following marketing recommendations.....	39, 938	499
Farmers assisted in using timely economic information as a basis for readjusting enterprise.....	94, 051	622
Sheep:		
Days devoted to line of work by extension agents.....	12, 996	1, 482
Days devoted to line of work by specialists.....	1, 333	520
Communities in which work was conducted.....	9, 101	1, 232
Voluntary local leaders or committeemen assisting.....	4, 705	793
Days of assistance rendered by voluntary leaders or committeemen.....	9, 803	660
Adult result demonstrations conducted.....	2, 779	315
Meetings at result demonstrations.....	709	165

⁴ Involves some duplication. Since some associations cover several counties, assistance given is reported by the agent in each county concerned. The Bureau of Dairy Industry reported a total of 809 herd-improvement associations at the end of 1934.

TABLE 1.—*Results of cooperative extension work, 1934—Continued*

ACTIVITIES BY PROJECTS—Continued

Project or line of work	Number or value	Agents reporting
Sheep—Continued.		
Method-demonstration meetings held.....	3, 774	610
Other meetings held.....	2, 700	618
News stories published.....	5, 725	1, 058
Different circular letters issued.....	3, 884	895
Farm or home visits made.....	27, 663	1, 307
Office calls received.....	119, 264	1, 546
4-H club projects completed.....	11, 867	956
Farmers assisted in obtaining purebred sires.....	7, 057	899
Farmers assisted in obtaining high-grade or purebred females.....	3, 285	524
Ram circles or clubs organized or assisted.....	91	44
Members in such circles or clubs.....	351	38
Flock-improvement associations organized or assisted.....	163	80
Members in such associations.....	5, 060	75
Farmers not in associations keeping performance records of animals.....	689	89
Families assisted in home butchering, meat cutting, and curing.....	2, 616	174
Farmers following parasite-control recommendations.....	41, 194	820
Farmers following disease-control recommendations.....	11, 321	420
Farmers following marketing recommendations.....	27, 741	472
Farmers assisted in using timely economic information as a basis for readjusting enterprise.....	24, 986	441
Swine:		
Days devoted to line of work by extension agents.....	101, 193	2, 413
Days devoted to line of work by specialists.....	5, 951	1, 117
Communities in which work was conducted.....	25, 843	2, 099
Voluntary local leaders or committeemen assisting.....	36, 072	1, 527
Days of assistance rendered by voluntary leaders or committeemen.....	183, 154	1, 281
Adult result demonstrations conducted.....	20, 137	598
Meetings at result demonstrations.....	3, 727	338
Method-demonstration meetings held.....	16, 980	1, 043
Other meetings held.....	44, 919	1, 494
News stories published.....	43, 639	1, 953
Different circular letters issued.....	30, 999	1, 766
Farm or home visits made.....	124, 388	2, 218
Office calls received.....	1, 955, 364	2, 348
4-H club projects completed.....	38, 199	1, 736
Farmers assisted in obtaining purebred sires.....	9, 530	1, 103
Farmers assisted in obtaining high-grade or purebred females.....	7, 399	742
Boar circles or clubs organized or assisted.....	201	56
Members in such circles or clubs.....	1, 165	47
Herd-improvement associations organized or assisted.....	36	29
Members in such associations.....	3, 230	28
Farmers not in associations keeping performance records of animals.....	14, 010	205
Families assisted in home butchering, meat cutting, and curing.....	40, 067	1, 082
Farmers following parasite-control recommendations.....	80, 063	1, 020
Farmers following disease-control recommendations.....	96, 905	1, 000
Farmers following marketing recommendations.....	79, 428	699
Farmers assisted in using timely economic information as a basis for readjusting enterprise.....	428, 474	963
Farms for which production-reduction contracts were signed.....	1, 135, 731	2, 436
Total reduction in number of animals on such farms.....	15, 647, 390	2, 039
Horses and mules:		
Days devoted to line of work by extension agents.....	4, 235	898
Days devoted to line of work by specialists.....	444	202
Communities in which work was conducted.....	4, 262	670
Voluntary local leaders or committeemen assisting.....	2, 344	378
Days of assistance rendered by voluntary leaders or committeemen.....	3, 541	299
Adult result demonstrations conducted.....	2, 204	133
Meetings at result demonstrations.....	298	69
Method-demonstration meetings held.....	1, 688	335
Other meetings held.....	898	236
News stories published.....	1, 911	486
Different circular letters issued.....	1, 932	345
Farm or home visits made.....	10, 472	788
Office calls received.....	44, 824	998
4-H club projects completed.....	2, 743	274
Farmers assisted in obtaining purebred sires.....	1, 117	309
Farmers assisted in obtaining high-grade or purebred females.....	2, 280	190
Stallion circles or clubs organized or assisted.....	143	91
Members in such circles or clubs.....	2, 987	70
Herd-improvement associations organized or assisted.....	39	30
Members in such associations.....	1, 240	30
Farmers not in associations keeping performance records of animals.....	445	31
Farmers following parasite-control recommendations.....	34, 930	355
Farmers following disease-control recommendations.....	10, 280	186
Farmers following marketing recommendations.....	1, 838	42
Farmers assisting in using timely economic information as a basis for readjusting enterprise.....	12, 359	148
Other livestock:		
Days devoted to line of work by extension agents.....	2, 010	339
Days devoted to line of work by specialists.....	232	64
Communities in which work was conducted.....	1, 548	234

TABLE 1.—*Results of cooperative extension work, 1934—Continued*

ACTIVITIES BY PROJECTS—Continued

Project or line of work	Number or value	Agents reporting
Other livestock—Continued.		
Voluntary local leaders or committeemen assisting.....	951	120
Days of assistance rendered by voluntary leaders or committeemen.....	1, 281	96
Adult result demonstrations conducted.....	595	42
Meetings at result demonstrations.....	55	21
Method-demonstration meetings held.....	453	80
Other meetings held.....	807	109
News stories published.....	1, 131	191
Different circular letters issued.....	720	129
Farm or home visits made.....	3, 991	272
Office calls received.....	38, 173	452
4-H club projects completed.....	2, 319	222
Farmers assisted in obtaining purebred sires.....	403	52
Farmers assisted in obtaining high-grade or purebred females.....	231	38
Sire circles or clubs organized or assisted.....	5	3
Members in such circles or clubs.....	20	1
Herd- or flock-improvement associations organized or assisted.....	14	11
Members in such associations.....	150	8
Farmers not in associations keeping performance records of animals.....	481	12
Farmers following parasite-control recommendations.....	2, 690	59
Farmers following disease-control recommendations.....	2, 511	57
Farmers following marketing recommendations.....	4, 081	34
Farmers assisted in using timely economic information as a basis for readjusting enterprise.....	723	38
Public problems and economic planning:		
Days devoted to line of work by extension agents.....	41, 883	1, 619
Days devoted to line of work by specialists.....	3, 530	524
Communities in which work was conducted.....	16, 999	1, 325
Voluntary local leaders or committeemen assisting.....	21, 933	912
Days of assistance rendered by voluntary leaders or committeemen.....	106, 758	806
Adult result demonstrations conducted.....	7, 944	183
Meetings at result demonstrations.....	1, 189	116
Method-demonstration meetings held.....	2, 732	275
Other meetings held.....	17, 603	1, 043
News stories published.....	16, 417	1, 049
Different circular letters issued.....	13, 851	838
Farm or home visits made.....	51, 947	1, 080
Office calls received.....	979, 593	1, 428
Farm records:		
Days devoted to line of work by extension agents.....	13, 657	1, 817
Days devoted to line of work by specialists.....	2, 856	836
Communities in which work was conducted.....	18, 603	1, 475
Voluntary local leaders or committeemen assisting.....	17, 462	822
Days of assistance rendered by voluntary leaders or committeemen.....	22, 972	683
Adult result demonstrations conducted.....	42, 368	424
Meetings at result demonstrations.....	1, 232	169
Method-demonstration meetings held.....	5, 600	668
Other meetings held.....	7, 007	851
News stories published.....	5, 551	1, 287
Different circular letters issued.....	5, 552	1, 279
Farm or home visits made.....	27, 453	1, 283
Office calls received.....	216, 036	1, 687
4-H club projects completed.....	10, 148	302
Individual farm planning:		
Days devoted to line of work by extension agents.....	5, 633	873
Days devoted to line of work by specialists.....	332	109
Communities in which work was conducted.....	4, 914	631
Voluntary local leaders or committeemen assisting.....	4, 570	169
Days of assistance rendered by voluntary leaders or committeemen.....	6, 096	140
Adult result demonstrations conducted.....	3, 864	139
Meetings at result demonstrations.....	254	44
Method-demonstration meetings held.....	1, 681	133
Other meetings held.....	943	167
News stories published.....	1, 033	246
Different circular letters issued.....	828	164
Farm or home visits made.....	10, 104	635
Office calls received.....	72, 573	805
4-H club projects completed.....	1, 265	24
Farm and home financing:		
Days devoted to line of work by extension agents.....	21, 567	1, 400
Days devoted to line of work by specialists.....	894	243
Communities in which work was conducted.....	13, 973	1, 023
Voluntary local leaders or committeemen assisting.....	11, 004	663
Days of assistance rendered by voluntary leaders or committeemen.....	18, 460	559
Adult result demonstrations conducted.....	10, 092	118
Meetings at result demonstrations.....	258	40
Method-demonstration meetings held.....	1, 314	168
Other meetings held.....	4, 323	690
News stories published.....	7, 530	979
Different circular letters issued.....	3, 590	616
Farm or home visits made.....	17, 601	876
Office calls received.....	418, 105	1, 354

TABLE 1.—*Results of cooperative extension work, 1934—Continued*

ACTIVITIES BY PROJECTS—Continued

Project or line of work	Number or value	Agents re- porting
Outlook:		
Days devoted to line of work by extension agents.....	5, 613	921
Days devoted to line of work by specialists.....	486	259
Communities in which work was conducted.....	7, 316	629
Voluntary local leaders or committeemen assisting.....	4, 016	285
Days of assistance rendered by voluntary leaders or committeemen.....	4, 215	255
Adult result demonstrations conducted.....	763	37
Meetings at result demonstrations.....	159	26
Method-demonstration meetings held.....	834	122
Other meetings held.....	3, 450	509
News stories published.....	3, 257	603
Different circular letters issued.....	2, 686	416
Farm or home visits made.....	8, 112	327
Office calls received.....	95, 826	724
Marketing, buying, selling, and financing:		
Days devoted to line of work by extension agents.....	18, 507	1, 352
Days devoted to line of work by specialists.....	1, 612	387
Communities in which work was conducted.....	12, 260	1, 045
Voluntary local leaders or committeemen assisting.....	8, 466	722
Days of assistance rendered by voluntary leaders or committeemen.....	17, 580	586
Adult result demonstrations conducted.....	7, 408	189
Meetings at result demonstrations.....	1, 231	112
Method-demonstration meetings held.....	2, 676	279
Other meetings held.....	6, 501	814
News stories published.....	7, 265	940
Different circular letters issued.....	6, 651	787
Farm or home visits made.....	26, 068	956
Office calls received.....	264, 007	1, 316
Farmers keeping regular farm accounts throughout the year.....	51, 801	1, 460
Farmers keeping Agricultural Adjustment Administration farm accounts throughout the year.....	1, 008, 869	1, 909
Farmers keeping cost-of-production records.....	69, 219	964
Farmers assisted in summarizing and interpreting their accounts.....	75, 218	1, 282
Farmers assisted in making inventory or credit statements.....	125, 437	1, 176
Farmers assisted in obtaining credit.....	458, 979	2, 154
Farmers assisted in making mortgage or other debt adjustments.....	58, 750	1, 525
Farm credit associations assisted in organizing during the year.....	2, 726	1, 621
Farm business or enterprise-survey records taken during the year.....	30, 502	409
Farmers making recommended changes in their business as result of keeping accounts or survey records.....	89, 310	973
Other farmers adopting cropping, livestock, or complete farming systems according to recommendations.....	205, 537	1, 019
Farmers advised relative to leases.....	76, 952	1, 519
Farmers assisted in developing supplemental sources of income.....	83, 429	1, 042
Families assisted in reducing cash expenditure by exchange of labor or machinery.....	38, 174	512
Families assisted in reducing cash expenditure by bartering farm or home products for other commodities or services.....	51, 721	639
Families assisted in reducing cash expenditure by producing larger part of food on the farm.....	443, 750	1, 231
Families assisted in reducing cash expenditure by making own repairs of buildings and machinery.....	45, 386	789
Urban families assisted in getting established on farms.....	18, 135	970
Farm families on relief assisted to become self-supporting.....	73, 286	1, 019
Marketing:		
Marketing associations or groups assisted in organizing during the year.....	1, 258	722
Marketing associations previously organized.....	4, 232	1, 451
Membership in associations and groups organized or assisted.....	703, 037	1, 493
Individuals (not in associations) assisted with marketing problems.....	221, 849	1, 464
Organizations assisted with problems of standardizing, packaging, or grading.....	1, 509	708
Organizations assisted with problems of processing or manufacturing.....	478	266
Organizations assisted with problems of locating markets and transportation.....	1, 330	666
Organizations assisted with problems of use of current market information.....	2, 352	776
Organizations assisted with problems of financing.....	1, 293	584
Organizations assisted with problems of organization.....	1, 736	802
Organizations assisted with problems of accounting.....	765	403
Organizations assisted with problems of keeping membership informed.....	3, 032	1, 011
Individuals (not in organizations) assisted with problems of standardizing, packaging, or grading.....	35, 382	644
Individuals (not in organizations) assisted with problems of processing or manufacturing.....	15, 305	280
Individuals (not in organizations) assisted with problems of locating markets and transportation.....	58, 449	838
Individuals (not in organizations) assisted with problems of use of current market information.....	106, 182	806
Value of products sold by all associations or groups organized or assisted.....	\$283, 395, 941	478
Value of products sold by individuals (not in organizations) assisted.....	\$50, 873, 794	435
Value of supplies purchased by all associations or groups organized or assisted.....	\$31, 250, 743	558
Value of supplies purchased by individuals (not in organizations) assisted.....	\$8, 671, 319	423

TABLE 1.—*Results of cooperative extension work, 1934*—Continued

ACTIVITIES BY PROJECTS—Continued

Project or line of work	Number or value	Agents reporting
Food selection and preparation:		
Days devoted to line of work by extension agents	50,307	1,327
Days devoted to line of work by specialists	3,501	861
Communities in which work was conducted	28,025	1,700
Voluntary local leaders or committeemen assisting	39,475	1,427
Days of assistance rendered by voluntary leaders or committeemen	97,074	1,177
Adult result demonstrations conducted	50,826	573
Meetings at result demonstrations	7,195	408
Method-demonstration meetings held by agents or specialists	55,477	1,483
Method-demonstration meetings held by leaders	50,059	916
Other meetings held by agents or specialists	8,281	818
Other meetings held by leaders	25,211	615
News stories published	28,688	1,439
Different circular letters issued	12,697	1,269
Farm or home visits made	59,463	1,437
Office calls received	113,911	1,599
4-H club projects completed	137,427	1,512
Food preservation:		
Days devoted to line of work by extension agents	54,643	1,287
Days devoted to line of work by specialists	1,899	642
Communities in which work was conducted	26,392	1,586
Voluntary local leaders or committeemen assisting	28,544	1,343
Days of assistance rendered by voluntary leaders or committeemen	100,694	1,127
Adult result demonstrations conducted	69,962	636
Meetings at result demonstrations	8,135	483
Method-demonstration meetings held by agents or specialists	48,392	1,420
Method-demonstration meetings held by leaders	47,987	868
Other meetings held by agents or specialists	6,402	613
Other meetings held by leaders	18,450	481
News stories published	16,909	1,336
Different circular letters issued	10,315	1,202
Farm or home visits made	151,237	1,430
Office calls received	271,317	1,549
4-H club projects completed	109,142	1,463
Dishes of food products prepared by club members completing project	3,117,479	1,186
Meals planned and served by club members completing project	1,660,603	1,169
Quarts of products canned by club members completing project	6,131,838	1,403
Other containers of jelly, jam, and other products prepared by club members completing project	1,121,577	1,107
Pounds of vegetables and fruits stored or dried by club members completing project	2,960,243	520
Families budgeting food expenditures for year	107,175	710
Families following food-buying recommendations	103,893	725
Families serving better balanced meals	273,253	1,305
Families improving home-packed lunches	120,984	997
Schools following recommendations for a hot dish or school lunch	17,913	844
Children involved	590,147	789
Families following recommended methods of child feeding	73,734	800
Individuals adopting recommendations for corrective feeding	76,243	776
Families producing and preserving home food supply according to annual food-supply budget	191,685	1,087
Families assisted in canning or otherwise preserving of fruits, vegetables, and meats	760,991	1,572
Quarts canned	68,449,609	1,473
Other containers of jam, jelly, or other products made by families	9,547,385	1,090
Estimated value of all products canned or otherwise preserved	\$18,681,003	1,400
Families following recommendations for the storage of home food supply	163,095	1,078
Families assisted in using timely economic information as a basis for readjusting family food supply	258,234	841
Child development and parent education:		
Days devoted to line of work by extension agents	7,558	538
Days devoted to line of work by specialists	992	228
Communities in which work was conducted	6,882	589
Voluntary local leaders or committeemen assisting	7,656	423
Days of assistance rendered by voluntary leaders or committeemen	18,501	352
Adult result demonstrations conducted	8,828	208
Meetings at result demonstrations	1,589	129
Method-demonstration meetings held by agents or specialists	5,545	398
Method-demonstration meetings held by leaders	8,135	195
Other meetings held by agents or specialists	3,331	246
Other meetings held by leaders	2,875	131
News stories published	4,230	430
Different circular letters issued	2,245	360
Farm or home visits made	11,294	488
Office calls received	17,088	537
4-H club projects completed	2,627	36
4-H club members not in special child-development projects who participated in definite child-development work	8,396	110
Families improving habits of children	51,532	499
Families substituting positive methods of discipline for negative ones	28,826	324

TABLE 1.—Results of cooperative extension work, 1934—Continued

ACTIVITIES BY PROJECTS—Continued

Project or line of work	Number or value	Agents re- porting
Child development and parent education—Continued.		
Families providing recommended play equipment.....	15,637	384
Families following recommendations regarding furnishings adapted to children's needs.....	13,200	352
Different men participating in child-development and parent-education program.....	6,221	118
Different women participating in child-development and parent-education program.....	69,940	395
Children involved in child-development and parent-education program.....	131,037	382
Clothing:		
Days devoted to line of work by extension agents.....	73,978	1,322
Days devoted to line of work by specialists.....	5,549	1,092
Communities in which work was conducted.....	31,445	1,912
Voluntary local leaders or committeemen assisting.....	50,922	1,722
Days of assistance rendered by voluntary leaders or committeemen.....	161,188	1,445
Adult result demonstrations conducted.....	83,179	708
Meetings at result demonstrations.....	10,534	575
Method-demonstration meetings held by agents or specialists.....	70,847	1,637
Method-demonstration meetings held by leaders.....	91,906	1,150
Other meetings held by agents or specialists.....	13,076	961
Other meetings held by leaders.....	35,219	750
News stories published.....	28,811	1,632
Different circular letters issued.....	16,294	1,522
Farm or home visits made.....	77,689	1,679
Office calls received.....	154,557	1,810
4-H club projects completed.....	237,027	1,982
Adults following recommendations in construction of clothing.....	304,480	1,276
Adults following recommendations in the selection of clothing.....	206,146	1,104
Adults keeping clothing accounts.....	28,989	619
Adults budgeting clothing expenditures.....	24,919	491
Families following clothing-buying recommendations.....	77,279	674
Adults improving children's clothing.....	86,682	856
Adults following recommendations in improving care, renovation, and remodeling of clothing.....	229,513	1,135
Families assisted in using timely economic information in determining how best to meet clothing requirements.....	150,981	626
Estimated savings due to clothing program of adults.....	1,630,600	971
Juniors following recommendations in construction of clothing.....	211,047	1,432
Juniors following recommendations in the selection of clothing.....	149,248	1,262
Juniors keeping clothing accounts.....	47,902	839
Juniors budgeting clothing expenditures.....	21,741	579
Juniors following recommendations in improving care, renovation, and remodeling of clothing.....	66,984	810
Estimated savings due to clothing program of juniors.....	\$502,849	934
Home management:		
Days devoted to line of work by extension agents.....	18,192	930
Days devoted to line of work by specialists.....	2,137	516
Communities in which work was conducted.....	13,802	1,025
Voluntary local leaders or committeemen assisting.....	19,144	735
Days of assistance rendered by voluntary leaders or committeemen.....	46,248	583
Adult result demonstrations conducted.....	26,806	402
Meetings at result demonstrations.....	2,629	262
Method-demonstration meetings held by agents or specialists.....	14,268	824
Method-demonstration meetings held by leaders.....	14,266	439
Other meetings held by agents or specialists.....	3,048	425
Other meetings held by leaders.....	4,870	230
News stories published.....	10,191	797
Different circular letters issued.....	5,159	692
Farm or home visits made.....	26,073	942
Office calls received.....	39,131	972
4-H club projects completed.....	15,651	283
Kitchens rearranged or improved for convenience.....	44,832	925
Families following recommendations in obtaining labor-saving equipment.....	52,198	891
Families adopting recommended laundering methods.....	39,682	572
Families assisted in home soap making.....	87,446	830
Families adopting recommended methods in care of house.....	93,155	740
Families assisted in making home-made equipment or conveniences.....	70,450	884
Women following a recommended schedule for home activities.....	32,217	488
4-H club members keeping personal accounts.....	17,025	441
Families keeping home accounts according to a recommended plan.....	20,035	682
Families budgeting expenditures in relation to income according to a recommended plan.....	15,581	438
Families assisted in developing home industries as a means of supplementing income.....	23,389	553
Families following recommended methods in buying for the home.....	34,908	533
Families assisted in using timely economic information as a basis for readjusting family living.....	45,411	466
Families assisted in making adjustments in homemaking to gain a more satisfactory standard of living.....	108,156	628
Families having increased time for rest and leisure activities as a result of the home-management program.....	45,244	470
Estimated savings due to home-management program.....	\$486,066	462

TABLE 1.—*Results of cooperative extension work, 1934—Continued*

ACTIVITIES BY PROJECTS—Continued

Project or line of work	Number or value	Agents reporting
House furnishings:		
Days devoted to line of work by extension agents.....	27, 162	1, 090
Days devoted to line of work by specialists.....	2, 843	578
Communities in which work was conducted.....	17, 024	1, 323
Voluntary local leaders or committeemen assisting.....	22, 246	999
Days of assistance rendered by voluntary leaders or committeemen.....	50, 701	802
Adult result demonstrations conducted.....	33, 443	501
Meetings at result demonstrations.....	4, 134	366
Method-demonstration meetings held by agents or specialists.....	24, 511	1, 134
Method-demonstration meetings held by leaders.....	26, 695	645
Other meetings held by agents or specialists.....	4, 160	521
Other meetings held by leaders.....	6, 217	332
News stories published.....	16, 028	986
Different circular letters issued.....	6, 726	874
Farm or home visits made.....	42, 902	1, 217
Office calls received.....	59, 346	1, 237
4-H club projects completed.....	55, 937	1, 146
Families improving the selection of household furnishings.....	117, 354	1, 016
Families following recommendations in improving methods of repairing, remodeling, or refinishing furniture.....	108, 592	1, 149
Families following recommendations in improving treatment of windows.....	77, 832	962
Families following recommendations in improving arrangement of rooms.....	106, 734	990
Families improving treatment of walls, woodwork, and floors.....	90, 226	1, 029
Families applying principles of color and design in improving appearance of rooms.....	75, 161	993
Estimated savings due to house-furnishing program.....	\$588, 977	723
Handicraft:		
Days devoted to line of work by extension agents.....	7, 071	528
Days devoted to line of work by specialists.....	576	146
Communities in which work was conducted.....	7, 103	588
Voluntary local leaders or committeemen assisting.....	6, 928	415
Days of assistance rendered by voluntary leaders or committeemen.....	10, 930	339
Adult result demonstrations conducted.....	12, 081	203
Meetings at result demonstrations.....	1, 043	128
Method-demonstration meetings held by agents or specialists.....	7, 110	484
Method-demonstration meetings held by leaders.....	6, 926	260
Other meetings held by agents or specialists.....	1, 281	158
Other meetings held by leaders.....	2, 945	137
News stories published.....	3, 466	300
Different circular letters issued.....	1, 727	270
Farm or home visits made.....	8, 006	397
Office calls received.....	13, 744	453
4-H club projects completed.....	27, 040	220
Families following recommendations regarding handicraft.....	67, 878	563
Home health and sanitation:		
Days devoted to line of work by extension agents.....	12, 394	800
Days devoted to line of work by specialists.....	1, 150	184
Communities in which work was conducted.....	15, 040	993
Voluntary local leaders or committeemen assisting.....	15, 277	737
Days of assistance rendered by voluntary leaders or committeemen.....	19, 115	630
Adult result demonstrations conducted.....	22, 237	327
Meetings at result demonstrations.....	3, 473	255
Method-demonstration meetings held by agents or specialists.....	11, 351	679
Method-demonstration meetings held by leaders.....	8, 260	340
Other meetings held by agents or specialists.....	3, 139	402
Other meetings held by leaders.....	3, 955	247
News stories published.....	4, 799	702
Different circular letters issued.....	3, 148	568
Farm or home visits made.....	22, 550	790
Office calls received.....	33, 683	878
4-H club projects completed.....	89, 751	595
4-H club boys not in special health projects who participated in definite health-improvement work.....	24, 970	294
4-H club girls not in special health projects who participated in definite health-improvement work.....	83, 717	602
4-H club members having health examination on recommendation of extension workers or participating in health contests.....	69, 549	749
Individuals other than 4-H club members having health examination on recommendation of extension workers or participating in health contests.....	37, 067	308
Individuals improving health habits.....	171, 165	935
Individuals improving posture.....	98, 494	789
Individuals adopting recommended positive preventive measures to improve health.....	222, 921	547
Families adopting better home-nursing procedure.....	36, 907	437
Families installing sanitary closets or outhouses.....	41, 483	641
Homes screened.....	24, 479	561
Families following other recommended methods of controlling flies, mosquitoes, and other insects.....	58, 177	608
Individuals enjoying improved health as a result of health and sanitation program.....	214, 029	562

TABLE 1.—*Results of cooperative extension work, 1934—Continued*

ACTIVITIES BY PROJECTS—Continued

Project or line of work	Number or value	Agents re- porting
Community or country-life activities:		
Communities assisted in making social or country-life surveys, or in scoring themselves or their community organizations.....	4, 885	408
Country-life conferences or training meetings conducted for community leaders.....	4, 949	627
Community groups assisted with organizational problems, programs of activities, or meeting programs.....	19, 019	1, 282
Communities developing recreation.....	13, 997	1, 149
Families following recommendations as to home recreation.....	74, 047	656
Community or county-wide pageants or plays presented.....	7, 343	911
Community houses, clubhouses, permanent camps, or community rest rooms established for adults.....	1, 148	350
Community houses, clubhouses, permanent camps, or community rest rooms established for juniors.....	248	152
Communities assisted in establishing work centers for canning, seed treatment, meat curing, etc.....	6, 158	785
Communities assisted in improving hygienic or public-welfare practices.....	5, 447	485
School or other community grounds improved in accordance with plans furnished.....	4, 776	776
Communities assisted in providing library facilities.....	2, 954	455
4-H clubs engaging in community activities, such as improving school grounds, conducting local fairs, etc.....	13, 597	1, 101
Families aided in obtaining assistance from Red Cross or other relief agency.....	160, 483	1, 024
Communities assisted in connection with the community or country-life work reported.....	24, 696	1, 285
Bees:		
Days devoted to line of work by extension agents.....	1, 660	421
Days devoted to line of work by specialists.....	645	237
Communities in which work was conducted.....	1, 679	406
Voluntary local leaders or committeemen assisting.....	891	243
Days of assistance rendered by voluntary leaders or committeemen.....	1, 081	195
Adult result demonstrations conducted.....	764	131
Meetings at result demonstrations.....	192	80
Method-demonstration meetings held.....	702	199
Other meetings held.....	610	173
News stories published.....	1, 035	304
Different circular letters issued.....	1, 773	248
Farm or home visits made.....	4, 084	354
Office calls received.....	10, 779	541
4-H club projects completed.....	989	211
Farmers following recommendations in transferring colonies to modern hives.....	2, 957	318
Colonies involved in preceding question.....	25, 251	293
Farmers following disease-control recommendations.....	7, 596	324
Farmers following requeening recommendations.....	3, 553	283
Farmers following marketing recommendations.....	1, 297	164
Predatory animals:		
Days devoted to line of work by extension agents.....	1, 306	175
Days devoted to line of work by specialists.....	193	36
Communities in which work was conducted.....	1, 138	153
Voluntary local leaders or committeemen assisting.....	888	98
Days of assistance rendered by voluntary leaders or committeemen.....	1, 822	72
Adult result demonstrations conducted.....	284	38
Meetings at result demonstrations.....	59	16
Method-demonstration meetings held.....	205	35
Other meetings held.....	542	44
News stories published.....	750	112
Different circular letters issued.....	292	54
Farm or home visits made.....	3, 196	131
Office calls received.....	12, 968	239
Farmers following recommendations.....	4, 638	128
Pounds of poison bait used.....	150, 781	83
Estimated savings due to control program.....	\$428, 080	88
Rodents:		
Days devoted to line of work by extension agents.....	4, 795	801
Days devoted to line of work by specialists.....	493	170
Communities in which work was conducted.....	6, 829	686
Voluntary local leaders or committeemen assisting.....	5, 019	357
Days of assistance rendered by voluntary leaders or committeemen.....	10, 693	305
Adult result demonstrations conducted.....	5, 167	217
Meetings at result demonstrations.....	854	107
Method-demonstration meetings held.....	1, 792	297
Other meetings held.....	776	181
News stories published.....	2, 330	586
Different circular letters issued.....	1, 252	368
Farm or home visits made.....	11, 379	627
Office calls received.....	68, 146	922
Farmers following recommendations.....	81, 377	615
Pounds of poison bait used.....	2, 764, 058	584
Estimated savings due to control program.....	\$3, 800, 906	500

TABLE 1.—*Results of cooperative extension work, 1934*—Continued

ACTIVITIES BY PROJECTS—Continued

Project or line of work	Number or value	Agents reporting
General feeder insects:		
Days devoted to line of work by extension agents.....	11, 774	1, 115
Days devoted to line of work by specialists.....	1, 500	507
Communities in which work was conducted.....	11, 525	984
Voluntary local leaders or committeemen assisting.....	14, 690	661
Days of assistance rendered by voluntary leaders or committeemen.....	42, 632	531
Adult result demonstrations conducted.....	12, 406	256
Meetings at result demonstrations.....	890	144
Method-demonstration meetings held.....	3, 400	550
Other meetings held.....	2, 896	460
News stories published.....	6, 935	930
Different circular letters issued.....	4, 252	676
Farm or home visits made.....	26, 287	1, 020
Office calls received.....	212, 940	1, 183
Farmers following recommendations.....	267, 553	800
Pounds of poison bait used.....	127, 179, 723	699
Estimated savings due to control program.....	\$29, 627, 092	612
Weeds:		
Days devoted to line of work by extension agents.....	2, 745	652
Days devoted to line of work by specialists.....	633	145
Communities in which work was conducted.....	4, 161	510
Voluntary local leaders or committeemen assisting.....	8, 731	254
Days of assistance rendered by voluntary leaders or committeemen.....	6, 058	205
Adult result demonstrations conducted.....	1, 995	174
Meetings at result demonstrations.....	279	76
Method-demonstration meetings held.....	1, 187	179
Other meetings held.....	742	165
News stories published.....	1, 866	407
Different circular letters issued.....	612	223
Farm or home visits made.....	5, 999	536
Office calls received.....	36, 531	714
Farmers following recommendations.....	25, 306	403
Pounds of poison used.....	778, 586	239
Estimated savings due to control program.....	\$480, 113	206
Miscellaneous:		
Days devoted to line of work by extension agents.....	107, 896	1, 231
Days devoted to line of work by specialists.....	5, 260	697
Communities in which work was conducted.....	19, 298	1, 098
Voluntary local leaders or committeemen assisting.....	55, 502	961
Days of assistance rendered by voluntary leaders or committeemen.....	138, 969	793
Adult result demonstrations conducted.....	6, 504	167
Meetings at result demonstrations.....	3, 998	124
Method-demonstration meetings held.....	13, 828	576
Other meetings held.....	60, 238	1, 047
News stories published.....	46, 212	1, 179
Different circular letters issued.....	30, 502	1, 095
Farm or home visits made.....	132, 364	1, 209
Office calls received.....	868, 243	1, 301
4-H club projects completed.....	12, 097	231
Total:		
Adult result demonstrations conducted.....	876, 623	-----
4-H club projects completed.....	1, 140, 922	-----

Enrollment and completions in 4-H clubs, 1934:

4-H clubs.....	55, 685
Different boys enrolled.....	366, 703
Different girls enrolled.....	549, 359
Total.....	916, 062
Different boys completing.....	253, 426
Different girls completing.....	398, 375
Total.....	651, 801

TABLE 2.—*Extension work with boys and girls, by projects,¹ as reported by county extension agents, 1934*

Project	Boys enrolled	Girls enrolled	Boys completing	Girls completing	Units involved in club work	Quantity produced
	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Acres</i>	
Corn.....	54,852	1,496	35,275	1,086	64,234	1,617,214 bushels.
Wheat.....	1,129	37	727	10	8,929	56,428 bushels.
Oats.....	852	20	512	8	2,276	41,877 bushels.
Rye.....	46	2	32	-----	66	638 bushels.
Barley.....	328	8	205	5	590	9,683 bushels.
Other cereals.....	2,221	203	1,191	132	2,906	
Alfalfa.....	360	1	263	-----	610	150 bushels.
Sweetclover.....	13	-----	7	-----	13	1,129 tons.
Other clovers.....	51	-----	50	-----	67	12 tons.
Vetch.....	1,788	34	1,363	32	454	8 bushels.
Lespedeza.....	291	40	219	33	381	21 tons.
Pastures.....	352	14	202	14	508	134 bushels.
Soybeans.....	1,474	33	846	31	2,391	574 tons.
Cowpeas.....	1,161	186	830	169	1,151	518 bushels.
Velvetbeans.....	288	21	182	14	217	150 tons.
Field beans.....	583	66	503	64	1,213	
Peanuts.....	7,608	686	4,346	515	3,315	9,875 bushels.
Other legumes.....	1,290	103	786	102	1,705	1,135 tons.
Potatoes.....	23,210	2,276	16,933	1,660	12,255	6,981 bushels.
Sweetpotatoes.....	6,486	652	4,077	500	2,501	374 tons.
Cotton.....	21,426	534	12,876	321	18,257	1,535 bushels.
Tobacco.....	5,072	565	3,730	415	2,895	140 tons.
Other special crops.....	1,682	142	1,037	82	1,643	4,184 bushels.
Home gardens.....	46,666	127,367	32,975	76,501	20,676	1,854,678 pounds.
Market-gardening, truck, and canning crops.....	3,902	10,440	2,559	7,139	3,190	3,612 bushels.
Beautification of home grounds.....	4,341	57,888	2,662	34,390	-----	1,019 tons.
Tree fruits.....	1,183	5,645	670	2,952	1,303	949,633 bushels.
Bush and small fruits.....	1,758	5,052	1,315	3,181	1,460	373,306 bushels.
Grapes.....	244	1,467	197	823	379	10,434,945 pounds.
Forestry.....	10,209	3,220	7,712	2,628	248,128	1,777,898 pounds.

Project	Boys enrolled	Girls enrolled	Boys completing	Girls completing	Units involved in club work
Agricultural engineering.....	8,506	1,860	4,779	1,080	
Poultry.....	46,884	52,347	30,505	34,020	2,245,726 birds.
Dairy cattle.....	38,685	6,725	28,838	5,085	40,424 animals.
Beef cattle.....	17,925	2,465	13,395	1,902	20,477 animals.
Sheep.....	13,421	2,240	10,118	1,749	33,045 animals.
Swine.....	55,435	3,821	35,551	2,648	82,247 animals.
Horses and mules.....	3,381	253	2,541	202	2,487 animals.
Farm management.....	11,059	5,797	6,941	4,472	
Food selection.....	6,970	192,381	4,427	133,000	
Food preservation.....	2,144	165,582	892	108,250	7,253,415 jars.
Child training.....	532	2,776	378	2,249	
Clothing.....	1,382	329,590	1,049	235,978	267,505 dresses.
Home management.....	918	26,630	610	15,041	24,070 articles.
House furnishings.....	1,781	84,426	1,176	54,761	38,466 rooms.
Handicraft.....	14,366	24,321	10,526	16,514	152,657 articles.
Home health and sanitation.....	28,720	109,297	18,659	71,092	94,845 articles.
Beekeeping.....	1,309	313	829	160	
Miscellaneous.....	6,987	11,062	4,481	7,616	4,169 colonies.
Total.....	464,596	1,240,432	312,068	828,854	

¹ 1 club member may engage in 2 or more projects. The sum of the projects is, therefore, greater than the number of different clubs and club members involved.

² Includes transplant beds.

TABLE 3.—*Number of counties with county agricultural and home demonstration agents (white), July 1, 1930-34*

State	Counties in State	1930		1931		1932		1933		1934	
		Men	Women	Men	Women	Men	Women	Men	Women	Men	Women
Alabama.....	67	63	42	64	44	61	41	65	41	67	51
Arizona.....	14	12	11	12	11	12	9	12	8	11	6
Arkansas.....	75	63	53	63	57	56	50	56	48	75	66
California.....	58	41	33	40	32	40	26	40	25	41	25
Colorado.....	63	33	15	33	13	27	10	23	7	42	7
Connecticut.....	8	8	8	8	8	8	8	8	8	8	8
Delaware.....	3	3	3	3	3	3	3	3	3	3	3
Florida.....	67	45	33	42	35	37	29	36	27	41	26
Georgia.....	159	108	72	134	81	147	187	151	183	153	185
Idaho.....	44	26	14	26	14	25	14	20	14	28	14
Illinois.....	102	93	29	98	34	98	36	98	36	100	137
Indiana.....	92	86	8	86	12	85	11	83	11	92	10
Iowa.....	99	99	127	99	131	99	128	99	129	99	126
Kansas.....	105	74	31	78	35	78	31	77	26	100	25
Kentucky.....	120	85	26	89	32	84	28	82	30	112	29
Louisiana.....	64	59	36	60	43	59	43	55	40	62	40
Maine.....	16	16	16	16	16	16	16	16	16	16	16
Maryland.....	23	23	23	23	23	23	23	23	23	23	23
Massachusetts.....	14	11	11	11	11	11	11	11	10	11	10
Michigan.....	83	65	9	66	8	68	6	68	5	70	5
Minnesota.....	87	62	10	64	13	62	12	58	12	81	10
Mississippi.....	82	66	56	75	62	74	57	64	148	78	156
Missouri.....	114	175	18	173	16	168	15	166	15	114	15
Montana.....	56	31	15	31	17	29	12	29	10	139	10
Nebraska.....	93	46	10	51	14	52	14	46	14	190	15
Nevada.....	17	13	9	14	9	14	8	14	7	13	6
New Hampshire.....	10	10	10	10	10	10	10	10	10	10	10
New Jersey.....	21	19	19	19	19	19	18	18	15	19	15
New Mexico.....	31	21	17	21	15	20	12	19	10	21	12
New York.....	62	55	41	55	41	54	39	50	37	50	33
North Carolina.....	100	82	56	85	57	84	56	82	52	93	54
North Dakota.....	53	34	8	33	5	31	5	22	4	52	4
Ohio.....	88	78	26	77	27	75	23	70	20	84	21
Oklahoma.....	77	72	59	74	64	68	62	69	59	77	60
Oregon.....	36	29	6	28	7	29	7	29	7	32	7
Pennsylvania.....	67	65	165	64	165	65	165	66	163	65	163
Rhode Island.....	5	5	5	5	5	5	5	5	5	5	5
South Carolina.....	46	45	46	45	46	46	46	46	46	46	46
South Dakota.....	69	32	17	31	18	24	13	18	128	169	126
Tennessee.....	95	81	49	82	47	74	37	72	37	94	38
Texas.....	254	178	118	189	127	168	113	167	124	235	144
Utah.....	29	22	10	23	10	22	10	22	10	20	8
Vermont.....	14	13	11	13	10	13	11	13	11	14	11
Virginia.....	100	77	40	84	50	77	40	79	41	192	41
Washington.....	39	29	11	29	12	28	11	28	10	38	10
West Virginia.....	55	43	126	42	127	45	132	48	131	44	128
Wisconsin.....	71	56	4	55	4	52	5	48	5	60	18
Wyoming.....	23	20	8	20	9	20	9	19	7	21	6
Hawaii.....	5	4	4	4	4	4	4	4	4	4	4
Total.....	3,075	2,376	1,333	2,447	1,402	2,369	1,306	2,307	1,259	2,814	1,305

¹ Some agents cover 2 or more counties.

Funds, 1934

Expenditures of Federal funds (exclusive of funds allocated by the Agricultural Adjustment Administration for educational phases of the adjustment program) and funds from sources within the States and Territories for cooperative extension work during the fiscal year ended June 30, 1934, amounted to \$20,230,558.64, which was \$2,184,813.49 less than the amount expended for the work in 1933. Funds from State and college sources were reduced by \$1,367,689.80, and funds from county appropriations and local organizations within the States were reduced by \$571,712.08. Federal extension funds were reduced by \$245,411.61.

Of the total amount, \$19,844,167.34, or 98.1 percent, was spent in the States and in Hawaii, Alaska, and Puerto Rico, and \$386,391.30, or 1.9 percent was spent in the administrative activities of the Federal office in Washington, D. C.

Expenditures from Federal sources amounted to \$9,603,172.75, or 47.5 percent, of the total funds; \$4,778,604.71, or 23.6 percent, was from State and college

sources; \$5,020,594.52, or 24.8 percent, was from county appropriations, and \$828,186.66, or 4.1 percent, was from local organizations and individuals.

Expenditures for county extension agents amounted to \$12,492,573.64, or 61.8 percent; for State subject-matter specialists \$3,886,694.17, or 19.2 percent; for administration and supervision in the States and Territories, \$3,464,899.53, or 17.1 percent.

Thirteen States and the Territory of Hawaii did not spend their entire allotments of Federal Smith-Lever, Capper-Ketcham, and additional cooperative funds, and had balances remaining unexpended on June 30, 1934, as shown in table 4.

TABLE 4.—*Unexpended balances of Federal extension funds for the year ended June 30, 1934*

State	Smith-Lever	Capper-Ketcham	Additional cooperative	Total
Arkansas.....	\$8, 839. 58	\$5, 551. 10	-----	\$14, 390. 68
Delaware.....	1, 474. 02	882. 48	-----	2, 356. 50
Illinois.....	-----	8, 122. 21	\$10, 598. 10	18, 720. 31
Minnesota.....	13, 231. 21	1, 020. 99	2, 582. 89	16, 835. 09
New York.....	4, 432. 03	46. 84	430. 17	4, 909. 04
North Carolina.....	21, 344. 11	-----	-----	21, 344. 11
North Dakota.....	8, 081. 23	1, 190. 90	1, 066. 00	10, 338. 13
Pennsylvania.....	6, 390. 48	-----	-----	6, 390. 48
Rhode Island.....	436. 43	-----	150. 00	586. 43
South Dakota.....	9, 700. 00	-----	-----	9, 700. 00
Washington.....	464. 32	2, 147. 47	-----	2, 611. 79
West Virginia.....	21, 653. 05	5, 349. 30	1. 09	26, 983. 44
Wisconsin.....	1, 793. 34	2, 083. 49	194. 36	4, 071. 19
Hawaii.....	4, 057. 75	1, 352. 36	-----	5, 410. 11
Total.....	101, 877. 55	27, 747. 14	15, 022. 61	144, 647. 30

In table 5 are shown the amounts not paid to five States and the Territory of Hawaii during the fiscal year 1934 because they were unable to offset the amounts with their own funds.

TABLE 5.—*Amounts withheld from States during the year ended June 30, 1934*

State	Smith-Lever	Capper-Ketcham	Additional cooperative	Total
Missouri.....	\$39, 740. 25	-----	-----	\$39, 740. 25
North Carolina.....	22, 703. 60	-----	-----	22, 703. 60
Rhode Island.....	1, 056. 28	-----	-----	1, 056. 28
South Carolina.....	36, 250. 20	-----	-----	36, 250. 20
South Dakota.....	-----	\$5, 200. 13	-----	5, 200. 13
Hawaii.....	2, 274. 14	455. 21	-----	2, 729. 35
Total.....	102, 024. 47	5, 655. 34	-----	107, 679. 81

Of the Federal Capper-Ketcham funds expended during the year, approximately 89½ percent was for salaries of county extension agents and 10½ percent for other extension purposes. About 54½ percent of these funds was expended for women extension agents.

Statements of the funds expended in each State and Territory by items of expense, lines of work, and sources are given on pages 64 to 80.

TABLE 6.—*Expenditures of funds from the Federal appropriation of May 8, 1914 extension work in each State, Alaska, and Hawaii for the*

State	Total	Adminis- tration	Printing and distri- bution of publica- tions	County agent work	Home dem- onstration work	Boys' and girls' club work
Alabama	\$277, 110. 13	\$8, 451. 11	\$3, 287. 94	\$124, 645. 63	\$84, 557. 59	\$8, 031. 89
Arizona	73, 764. 77	9, 721. 23	1, 252. 69	18, 548. 13	15, 540. 36	3, 365. 50
Arkansas	233, 757. 07	16, 486. 72	5, 501. 39	81, 279. 52	67, 102. 86	7, 758. 09
California	213, 923. 31	6, 229. 37	-----	136, 423. 20	57, 618. 16	4, 790. 95
Colorado	104, 162. 17	6, 790. 24	1, 841. 35	36, 377. 82	13, 523. 34	3, 506. 90
Connecticut	91, 486. 15	5, 646. 65	-----	5, 890. 50	14, 481. 68	20, 101. 73
Delaware	43, 214. 53	5, 755. 76	892. 49	10, 693. 89	10, 841. 00	8, 870. 28
Florida	131, 739. 98	3, 819. 98	465. 36	56, 731. 87	42, 263. 05	2, 897. 38
Georgia	307, 843. 59	22, 893. 79	4, 411. 92	148, 321. 47	92, 670. 60	5, 245. 76
Idaho	79, 183. 01	4, 411. 68	1, 035. 23	29, 428. 68	16, 058. 04	2, 869. 06
Illinois	289, 769. 46	26, 201. 64	9, 651. 25	79, 532. 18	59, 894. 92	26, 019. 81
Indiana	221, 432. 28	11, 215. 67	2, 084. 21	49, 611. 47	25, 150. 81	45, 509. 29
Iowa	228, 055. 51	7, 300. 00	-----	104, 623. 51	25, 900. 00	11, 632. 00
Kansas	188, 510. 53	18, 158. 30	480. 06	76, 417. 78	33, 666. 17	10, 386. 77
Kentucky	269, 200. 78	12, 602. 21	4, 031. 32	174, 917. 06	25, 359. 31	15, 582. 38
Louisiana	197, 915. 66	8, 694. 58	83. 30	103, 111. 20	60, 669. 63	8, 452. 65
Maine	94, 576. 07	8, 735. 64	1, 566. 35	27, 771. 44	28, 965. 70	14, 779. 08
Maryland	122, 302. 53	6, 242. 04	1, 800. 25	48, 560. 47	32, 365. 89	1, 867. 50
Massachusetts	85, 955. 96	7, 090. 01	1, 218. 32	10, 273. 14	8, 362. 66	23, 744. 30
Michigan	228, 629. 09	4, 403. 73	-----	119, 690. 34	11, 372. 50	29, 533. 69
Minnesota	204, 804. 98	8, 458. 67	-----	67, 622. 43	22, 366. 08	28, 800. 95
Mississippi	250, 619. 60	25, 263. 87	1, 039. 72	69, 979. 11	67, 118. 48	9, 090. 71
Missouri	227, 264. 00	6, 009. 41	3, 223. 74	129, 692. 20	30, 895. 62	11, 310. 12
Montana	91, 889. 88	7, 224. 67	2, 403. 07	36, 733. 27	15, 120. 15	3, 968. 90
Nebraska	155, 474. 12	6, 242. 72	309. 58	56, 241. 10	22, 431. 46	10, 555. 79
Nevada	46, 489. 95	9, 164. 65	429. 97	14, 244. 20	11, 470. 75	-----
New Hampshire	59, 042. 25	4, 480. 31	1, 575. 00	10, 398. 13	9, 394. 08	13, 641. 97
New Jersey	123, 012. 59	15, 103. 55	3, 410. 12	26, 063. 63	9, 890. 42	21, 097. 29
New Mexico	76, 294. 94	6, 190. 40	-----	36, 692. 07	13, 327. 23	-----
New York	290, 882. 86	8, 345. 75	2, 568. 88	73, 510. 49	53, 792. 01	45, 499. 12
North Carolina	308, 980. 01	7, 945. 84	-----	151, 272. 03	83, 779. 77	2, 136. 00
North Dakota	115, 582. 88	8, 185. 50	3, 138. 10	38, 552. 83	13, 892. 63	8, 357. 25
Ohio	296, 328. 49	15, 132. 45	13, 345. 23	123, 065. 73	41, 028. 14	24, 138. 46
Oklahoma	238, 540. 57	13, 993. 97	4, 140. 65	100, 726. 71	71, 389. 37	5, 632. 97
Oregon	102, 714. 07	10, 399. 73	1, 938. 37	15, 565. 09	17, 895. 65	24, 179. 93
Pennsylvania	395, 246. 55	28, 235. 75	2, 971. 66	141, 834. 86	135, 905. 70	7, 713. 50
Rhode Island	35, 514. 65	2, 611. 20	416. 91	7, 701. 97	8, 442. 28	8, 671. 75
South Carolina	178, 189. 90	14, 413. 51	-----	80, 489. 96	47, 950. 37	5, 783. 27
South Dakota	109, 240. 90	3, 733. 63	609. 15	38, 148. 29	20, 309. 00	12, 903. 90
Tennessee	261, 244. 09	10, 216. 50	-----	133, 746. 15	71, 465. 57	2, 526. 00
Texas	481, 952. 77	33, 830. 40	10, 960. 31	255, 731. 18	116, 204. 59	2, 154. 65
Utah	70, 703. 67	7, 792. 19	951. 10	29, 458. 05	10, 445. 65	4, 433. 46
Vermont	68, 619. 04	7, 925. 13	719. 65	15, 817. 06	12, 287. 44	14, 235. 37
Virginia	250, 645. 29	30, 620. 35	-----	121, 348. 63	62, 311. 12	4, 634. 40
Washington	123, 848. 34	13, 836. 57	5, 377. 04	49, 094. 43	18, 910. 45	9, 910. 88
West Virginia	181, 934. 11	13, 443. 36	894. 88	64, 892. 40	27, 151. 02	18, 602. 40
Wisconsin	209, 644. 39	11, 627. 78	10, 496. 72	59, 793. 48	11, 192. 32	23, 954. 26
Wyoming	58, 828. 39	8, 208. 80	477. 29	22, 192. 97	10, 653. 90	666. 71
Alaska	12, 000. 00	1, 004. 34	-----	3, 900. 00	3, 495. 66	-----
Hawaii	51, 500. 00	1, 585. 23	1, 509. 04	18, 763. 50	18, 355. 98	-----
Total, 1934	8, 559, 565. 86	541, 576. 58	112, 509. 61	3, 436, 121. 25	1, 785, 242. 16	579, 575. 02
1933	8, 652, 815. 14	472, 932. 05	140, 904. 05	3, 380, 118. 33	1, 838, 824. 58	584, 974. 64
1932	8, 666, 966. 21	482, 532. 84	129, 907. 01	3, 450, 074. 24	1, 854, 263. 40	595, 632. 85
1931	8, 672, 436. 00	493, 384. 96	111, 878. 23	3, 396, 689. 72	1, 963, 809. 69	620, 066. 69
1930	7, 662, 936. 00	441, 047. 50	104, 722. 07	3, 176, 261. 06	1, 750, 465. 35	557, 633. 89
1929	7, 152, 180. 80	480, 197. 89	120, 900. 84	3, 006, 954. 75	1, 387, 415. 28	507, 959. 07

(Smith-Lever) and from appropriations supplementary thereto for cooperative work ended June 30, 1934, by projects, and totals for 1929-33

Home economics specialists	Extension schools	Animal husbandry	Poultry	Dairying	Animal diseases	Agronomy	Foods and nutrition	Child care and training
	\$2,831.26	\$10,223.04				\$2,011.71	\$5,816.65	
		4,790.00	\$1,904.07	\$1,719.50		2,960.23		
		3,532.75	3,082.53	369.50		4,390.93	5,500.58	
		5,312.71	783.81	2,012.24	\$1,950.88	3,356.12	1,246.07	
\$2,376.00		262.35	7,983.71	6,424.00		3,612.00	2,752.00	
			403.45				2,171.92	
		1,080.00	3,045.00	3,045.00		4,521.30	2,700.00	
		826.96	3,191.50	3,306.99		4,907.42	3,880.22	
		2,067.22	2,360.35	2,385.51				
3,295.79		4,842.15	3,404.31	6,684.66	1,795.42	9,171.46	5,622.84	\$3,087.07
	3,279.56	11,252.84	8,866.36	11,348.53		8,070.68	4,829.26	
		5,200.00	4,000.00	13,900.00	1,600.00	5,000.00	5,200.00	1,850.00
2,030.94	1,500.75	3,012.77	3,451.87	3,861.32	1,562.42	4,182.01	2,926.61	
	1,463.12	2,734.78	4,004.47	4,074.32	1,770.58	3,141.92	1,946.86	
		1,959.92		1,181.66		2,473.70		
		1,396.10	170.50	2,566.03		1,726.42	1,494.67	
		2,384.00	181.50			2,464.50	2,176.70	1,930.34
		3,690.00	3,969.38	5,310.00	2,100.00	11,931.20	1,080.00	1,128.00
		5,756.10	3,469.43	8,361.20	3,812.82	3,008.96	6,999.82	270.00
		4,512.23	7,570.99	7,558.91			7,045.92	
	1.24	4,641.82	2,345.49	5,465.04	248.35	9,366.36	2,243.13	
		2,559.99	2,897.66			2,740.00	2,236.40	
		4,470.66	5,748.50	4,058.30		6,253.14	3,969.66	
			3,397.50	4,190.82		1,231.76	2,551.00	4,263.93
			4,844.31	4,324.09		2,858.00		
6,996.15	7,914.62	2,543.25	3,427.43	4,200.35		5,336.64	5,419.13	923.38
		13,089.21	2,408.73			4,568.79	2,202.25	
			4,577.00	10,173.84		182.20	2,936.44	
			3,241.17	3,733.48		7,516.97	441.66	
		7,189.62	6,615.21			4,074.19	2,235.77	2,924.20
		10,853.40	3,316.56	4,248.17		5,629.81	2,164.62	
		3,026.33	3,012.03	1,973.36		5,733.89	3,970.39	
		2,467.44	5,687.59	14,286.36		329.10		
		7,783.65	1,926.04			3,357.06	1,710.00	
1,425.26		1,273.41	4,252.42	1,426.52		2,467.93	2,260.78	
		2,963.65	2,427.30	2,299.66		2,257.00	2,281.50	
2,511.00		1,971.44	3,663.90	5,409.35		2,458.50	2,583.38	
		6,804.25	6,744.16	5,624.79		2,658.36	2,187.84	
		12,478.63	2,468.88	510.00		2,003.62	1,177.52	
		2,558.48	3,152.12	3,603.81		927.78		
			715.04	4,220.41		3,327.63	46.14	
		3,658.55	4,005.65	696.31		2,580.00		
		1,680.90	1,951.75	2,970.90	1,442.65	10,336.31	2,615.08	
		3,479.94	7,562.10	15,642.29		1,108.80	2,256.52	
		10,241.23	2,250.00	1,125.00	3,600.00			
		1,125.00				83.03		
			2,154.97					
18,635.14	16,990.55	181,696.77	156,636.74	184,292.22	19,883.12	166,317.43	110,879.33	16,376.92
20,431.76	18,057.00	182,198.64	160,908.34	173,232.23	23,321.52	175,040.28	115,457.09	12,571.30
28,583.91	20,811.86	171,598.29	143,453.91	217,625.71	18,201.74	185,792.14	113,751.68	12,627.92
27,757.23	18,374.42	176,826.99	148,794.11	193,918.13	19,469.84	200,241.97	117,438.10	16,234.93
23,944.53	21,399.65	147,594.34	138,640.27	182,654.64	12,775.82	160,813.86	114,404.42	14,757.20
21,582.13	15,090.43	158,847.98	139,520.30	171,364.05	17,541.93	169,075.67	102,798.92	4,646.91

TABLE 6.—Expenditures of funds from the Federal appropriation of May 8, 1914 extension work in each State, Alaska, and Hawaii for the

State	Clothing	Home management	Horticulture	Botany and plant pathology	Entomology, apiculture, ornithology	Rodent pests	Forestry
Alabama.....	\$2,866.20	\$2,691.30	\$4,020.90	-----	\$2.25	-----	-----
Arizona.....	3,161.31	-----	2,694.77	-----	-----	-----	-----
Arkansas.....	2,626.08	3,302.28	3,494.10	-----	-----	-----	-----
California.....	-----	-----	-----	-----	-----	-----	-----
Colorado.....	2,353.86	956.61	1,820.70	-----	628.76	-----	-----
Connecticut.....	2,640.00	2,795.00	6,794.00	-----	699.16	-----	-----
Delaware.....	-----	-----	-----	\$146.77	1,082.47	-----	-----
Florida.....	-----	2,961.00	1,071.34	1,071.83	1,071.33	-----	-----
Georgia.....	4,152.24	2,668.11	2,340.25	-----	-----	-----	\$2,968.87
Idaho.....	2,840.47	-----	1,953.72	-----	1,365.55	-----	-----
Illinois.....	3,126.82	6,815.66	5,704.26	-----	-----	-----	-----
Indiana.....	2,502.74	5,477.00	13,125.83	4,414.87	-----	-----	-----
Iowa.....	4,100.00	10,000.00	7,200.00	850.00	4,000.00	-----	-----
Kansas.....	1,939.14	3,981.32	3,984.17	1,463.28	1,582.44	-----	-----
Kentucky.....	3,198.67	1,671.13	4,343.00	-----	-----	-----	-----
Louisiana.....	-----	-----	2,255.15	-----	1,148.70	-----	-----
Maine.....	-----	-----	-----	-----	-----	-----	-----
Maryland.....	1,883.15	-----	6,578.66	3,101.50	1,834.55	-----	-----
Massachusetts.....	2,158.85	4,559.22	5,852.51	2,241.61	-----	-----	-----
Michigan.....	1,080.00	3,060.00	8,538.28	1,695.00	1,140.00	-----	-----
Minnesota.....	6,818.81	3,229.30	42.42	2,999.93	720.75	-----	195.00
Mississippi.....	3,294.33	3,610.56	7,816.07	-----	-----	-----	724.66
Missouri.....	2,177.00	5,317.74	4,043.01	-----	585.67	-----	-----
Montana.....	2,096.25	2,192.50	2,229.96	-----	-----	-----	-----
Nebraska.....	1,793.00	7,219.20	2,896.66	-----	1,519.00	-----	-----
Nevada.....	-----	-----	-----	-----	-----	-----	-----
New Hampshire.....	1,200.00	2,700.00	2,348.31	-----	-----	-----	-----
New Jersey.....	2,117.26	787.00	4,773.39	-----	-----	-----	2,383.65
New Mexico.....	-----	-----	2,821.39	-----	-----	-----	-----
New York.....	9,911.02	11,292.07	4,200.32	3,020.06	5,754.92	-----	1,572.30
North Carolina.....	2,202.25	2,202.25	4,519.00	-----	4,285.50	-----	-----
North Dakota.....	3,699.58	2,859.05	-----	-----	3,336.91	-----	-----
Ohio.....	3,889.92	5,818.08	4,464.65	5,252.19	5,446.14	-----	275.50
Oklahoma.....	935.63	3,019.75	2,759.27	-----	177.83	-----	-----
Oregon.....	1,966.94	-----	3,760.50	-----	-----	-----	-----
Pennsylvania.....	3,448.53	3,624.57	4,190.00	8,638.46	1,840.63	-----	2,130.49
Rhode Island.....	-----	-----	1,746.91	-----	-----	-----	-----
South Carolina.....	1,589.69	-----	2,561.11	-----	926.11	-----	-----
South Dakota.....	-----	2,274.82	1,135.93	-----	1,135.93	-----	-----
Tennessee.....	2,511.00	-----	3,515.40	-----	-----	-----	-----
Texas.....	3,004.74	5,876.60	5,182.62	-----	2,588.13	-----	-----
Utah.....	1,133.97	2,106.00	-----	-----	-----	-----	-----
Vermont.....	1,148.39	2,809.25	-----	-----	-----	-----	-----
Virginia.....	-----	-----	3,621.56	213.33	-----	-----	-----
Washington.....	2,757.62	4,004.01	655.57	-----	-----	-----	-----
West Virginia.....	-----	-----	1,547.25	-----	-----	-----	377.50
Wisconsin.....	2,629.18	4,242.43	8,839.72	5,337.35	-----	-----	4,569.95
Wyoming.....	2,541.20	1,701.00	1,243.20	-----	-----	-----	-----
Alaska.....	-----	-----	-----	-----	-----	-----	-----
Hawaii.....	-----	-----	-----	-----	-----	-----	-----
Total, 1934.....	103,495.39	127,824.81	162,685.86	40,445.68	42,872.73	-----	15,197.92
1933.....	100,981.33	122,405.09	170,899.96	37,345.79	49,601.58	-----	11,728.02
1932.....	99,039.98	122,334.27	173,323.65	40,714.70	49,211.18	-----	9,204.94
1931.....	108,979.23	125,569.01	168,407.67	44,339.95	50,878.29	-----	7,060.54
1930.....	95,736.15	108,213.47	135,732.37	45,716.36	47,727.88	-----	4,599.52
1929.....	113,911.53	90,000.49	129,679.63	41,694.31	34,651.27	\$71.73	5,876.69

(Smith-Lever) and from appropriations supplementary thereto for cooperative year ended June 30, 1934, by projects, and totals for 1929-33—Continued

Agricultural engineering	Rural organization	Agricultural economics			Exhibits and fairs	Information	Miscellaneous specialists	Unexpended balance
		Farm management	Marketing	General				
\$5,451.50		\$1,978.57	\$3,957.13	\$2,845.48		\$3,439.98		
756.58	\$4,232.36	3,874.62						
			9,838.18			4,344.30		\$14,390.68
	1,992.72	3,986.75	4,874.88					
		10,835.62	1,835.05			7,032.37		
		4,753.83	2,443.08			1,830.46		
	994.56	1,654.88	2,649.40	1,324.70		3,393.80		2,356.50
2,254.28			4,189.33					
		3,750.04	3,750.04					
3,130.47	1,711.23	7,740.19	169.80			3,447.22		18,720.31
2,590.38		6,086.46	5,892.80			123.52		
1,500.00	1,300.00	3,200.00	7,200.00		\$500.00	2,000.00		
3,022.90	83.33	3,311.56	4,886.35			2,618.27		
2,856.32	567.03	2,259.43	1,004.56			1,672.81		
1,400.00	1,525.00	3,363.46	516.66			1,080.05		
		4,541.69	3,622.31			4,593.86		
2,664.62		2,990.19	2,393.76	632.30		2,033.93		
1,928.93		2,698.62	3,410.25			3,280.50		
3,399.84		2,499.96	11,031.21			1,975.96		
		6,356.33	5,864.79			2,816.60		16,835.09
5,310.15	6,276.60	3,978.28	7,956.55	7,956.55		4,515.91		
2,586.27		3,142.77	2,612.57			1,356.45		
		3,659.98	1,612.50	1,620.00		2,594.68		
6,599.15		10,326.08	1,864.46			2,945.66		
		5,000.00	5,000.00			1,180.38		
		2,147.68	3,568.45					
1,354.39		6,993.79	3,370.16			8,452.85		
				4,234.82				
6,140.92	980.74	8,549.11	8,549.13			199.12		4,909.04
			7,771.38					21,344.11
724.67		1,470.45				3,744.87		10,338.13
4,049.37		8,963.33	10,744.59			5,287.47		
3,803.69		2,977.74	1,719.87			7,437.90		
				10,066.81	1,617.05	76.74		
292.04		1,600.99	6,966.96			2,000.00		6,390.48
				1,808.65				586.43
		1,308.80	7,119.07			913.10		
847.76	1,261.92	1,857.07	1,107.31			2,789.08		9,700.00
		5,129.11	6,652.76			2,554.60		
2,308.44	3,914.87		3,292.63			7,014.15		
				2,479.69		1,520.00		
		1,691.13	1,828.55			220.00		
33.35		3,183.69	5,306.17	7,428.63		2,422.28		
		1,887.63	2,260.09			2,785.63		2,611.79
	8,018.14			3,593.55		4,004.93		26,983.44
2,402.35	406.06	2,456.18	2,585.50			8,642.91		4,071.19
		3,278.00						
		3,638.14						5,410.11
67,408.37	33,264.56	159,122.15	171,418.28	43,991.18	2,117.05	118,341.74		144,647.30
79,299.73	24,279.36	180,324.81	252,288.88	11,736.95	2,369.63	99,874.25	\$3,100.00	207,607.95
80,999.25	28,078.49	172,785.18	253,939.39	70,551.32	2,261.84	89,799.68	4,375.64	45,489.20
70,422.56	24,606.04	178,538.55	254,201.73	4,319.25	4,999.38	91,525.25		33,703.54
69,203.02	30,928.83	81,325.56	83,808.64		2,700.00	83,422.81		22,206.79
60,774.77	15,248.78	81,369.52	80,897.72		4,941.28	87,781.26		101,385.67

TABLE 7.—Expenditures of funds from sources within States to offset expenditures supplementary thereto for cooperative extension work in each State, Alaska,

State	Totals	Adminis- tration	Printing and distri- bution of publica- tions	County agent work	Home dem- onstration work	Boys' and girls' club work
Alabama.....	\$218,110.13	\$3,149.04	\$1,357.77	\$130,319.97	\$59,324.31	\$1,892.51
Arizona.....	32,764.77	-----	-----	29,341.49	3,033.77	68.45
Arkansas.....	154,866.39	-----	-----	89,183.61	65,182.78	-----
California.....	173,923.31	-----	-----	152,502.50	9,554.26	11,866.55
Colorado.....	59,162.17	1,920.00	174.41	30,537.33	3,651.21	864.80
Connecticut.....	54,486.15	6,909.10	92.25	2,422.49	1,863.45	6,069.14
Delaware.....	10,858.03	327.91	-----	2,864.76	2,243.27	3,423.10
Florida.....	81,239.98	4,190.64	2,782.38	27,453.15	31,717.26	2,485.00
Georgia.....	230,843.59	16,000.98	7,331.78	125,798.29	56,937.71	2,301.75
Idaho.....	36,183.01	3,083.93	-----	13,361.15	4,416.11	671.39
Illinois.....	220,647.25	-----	-----	200,107.77	20,539.48	-----
Indiana.....	165,432.28	-----	-----	165,432.28	-----	-----
Iowa.....	171,055.51	8,428.04	-----	109,397.44	5,818.99	7,397.29
Kansas.....	132,010.53	8,884.53	816.00	67,824.79	6,499.54	7,213.14
Kentucky.....	208,200.78	7,161.50	488.00	85,564.17	50,912.94	15,098.00
Louisiana.....	145,415.66	19,773.81	1,633.90	56,733.62	35,102.66	3,376.43
Maine.....	54,576.07	7,898.39	-----	12,000.49	1,710.55	7,131.81
Maryland.....	75,302.53	3,862.91	2,459.28	29,420.20	22,689.19	4,500.00
Massachusetts.....	47,955.96	5,375.83	-----	1,918.50	3,066.62	9,151.28
Michigan.....	176,629.09	4,697.45	9,636.03	58,743.15	7,606.94	22,942.89
Minnesota.....	135,552.78	3,187.89	5,747.43	105,762.08	3,712.32	4,054.10
Mississippi.....	191,619.60	5,305.64	782.35	122,807.49	50,284.60	5,322.00
Missouri.....	163,264.00	7,371.90	994.94	127,584.59	2,286.99	2,468.70
Montana.....	40,889.88	1,626.80	198.75	29,723.47	2,094.76	1,011.00
Nebraska.....	102,274.12	6,541.93	2,839.29	57,033.18	7,389.08	6,887.94
Nevada.....	6,489.95	-----	-----	3,300.00	1,902.38	-----
New Hampshire.....	22,042.25	-----	-----	3,779.00	10,881.00	7,382.25
New Jersey.....	80,512.59	-----	-----	20,742.59	9,435.00	13,736.74
New Mexico.....	36,294.94	3,930.25	2,378.86	16,241.33	6,273.82	-----
New York.....	232,453.99	-----	-----	118,134.42	57,796.26	56,523.31
North Carolina.....	226,635.90	17,650.28	3,388.20	121,519.49	55,715.88	1,307.36
North Dakota.....	55,810.75	1,000.00	-----	53,144.08	833.34	833.33
Ohio.....	245,328.49	14,224.56	722.70	119,371.08	23,079.04	19,434.11
Oklahoma.....	180,540.57	6,917.16	1,357.66	84,565.54	69,260.36	4,345.42
Oregon.....	53,214.07	3,495.61	-----	31,590.26	2,293.13	4,519.69
Pennsylvania.....	348,856.07	15,710.88	3.18	200,267.95	1,269.89	17,022.22
Rhode Island.....	4,478.22	213.35	-----	1,475.16	1,047.00	1,000.60
South Carolina.....	120,589.90	8,185.30	1,345.38	57,918.35	51,029.81	152.02
South Dakota.....	49,540.90	8,076.53	4,456.86	15,896.04	5,026.97	4,258.44
Tennessee.....	197,244.09	7,128.26	2,264.77	125,387.98	35,700.92	1,455.50
Texas.....	393,952.77	-----	4,740.06	247,365.81	123,347.96	1,125.00
Utah.....	27,703.67	7,951.78	479.11	6,806.03	3,950.97	1,253.66
Vermont.....	27,619.04	1,464.11	-----	7,700.00	6,553.33	7,892.52
Virginia.....	187,645.29	2,023.25	11,029.33	74,518.08	25,818.62	38.67
Washington.....	73,096.03	161.31	-----	63,716.55	3,787.73	4,767.64
West Virginia.....	114,951.76	5,040.73	5,857.33	38,597.73	15,367.04	22,007.08
Wisconsin.....	154,967.56	2,249.63	854.18	102,312.05	4,909.31	7,557.41
Wyoming.....	17,828.39	88.20	-----	6,021.23	2,153.80	4,626.00
Alaska.....	2,000.00	-----	-----	800.00	1,000.00	-----
Hawaii.....	16,089.89	7,447.71	-----	276.52	3,591.88	-----
Puerto Rico.....	-----	-----	-----	-----	-----	-----
Total, 1934.....	5,958,650.65	238,657.12	76,212.18	3,355,285.23	979,664.23	307,436.24
1933.....	7,174,335.34	295,676.26	91,160.47	3,684,765.88	1,178,931.46	347,048.23
1932.....	7,186,966.21	274,592.90	84,706.28	3,815,936.79	1,222,065.75	362,830.68
1931.....	7,192,436.00	290,276.00	90,863.59	3,795,996.25	1,128,353.24	365,232.30
1930.....	6,192,936.00	281,502.00	70,724.45	3,142,448.31	945,955.56	306,966.77
1929.....	5,692,936.00	300,878.57	66,538.82	2,896,354.18	866,956.17	233,896.16

from the Federal appropriation of May 8, 1914 (Smith-Lever) and from appropriation and Hawaii for the year ended June 30, 1934, by projects, and totals for 1929-33

Home-economics specialists	Extension schools	Animal husbandry	Poultry	Dairying	Animal diseases	Agronomy	Foods and nutrition	Child care and training
	\$944.04	\$4,103.34 101.96				\$674.49 49.71	\$2,480.14	
			\$72.04	\$72.05				
		2,809.97	2,708.40	2,963.52	\$999.96	2,631.33	2,155.31	
\$1,022.43		1,752.44	3,895.61	3,859.91		1,721.99	937.09	
			600.00				1,245.02	
	273.01	1,082.25	883.60	2,210.13			797.45	
		1,080.74	1,238.76	2,259.66		2,742.35	2,765.05	
		2,468.04	2,212.20	3,190.05		2,582.49		
		2,595.85	2,303.66	5,394.68	336.50	3,462.95	1,143.83	\$642.00
1,121.57	1,947.85	3,458.39	3,230.54	3,535.66	1,514.15	5,451.14	1,953.19	
	2,142.00	6,204.00	5,180.00	3,107.89	1,920.00	5,076.00	1,800.00	
		3,483.71		2,807.71		5,410.29		
			3,442.14	3,539.05		2,099.98	2,850.31	
		1,678.15	2,263.96	1,664.34		1,558.22	989.68	
		1,427.50	1,680.00			1,577.50	2,372.26	1,162.50
		4,109.66	3,779.88	6,274.80	2,708.28	9,813.31	1,945.79	2,617.91
		2,520.00		2,265.00		2,195.85		1,612.90
		364.25	553.50	1,031.29			495.00	
	214.25	2,700.61	1,454.18	1,936.20	1,045.75	4,534.69	841.77	
		480.00	702.24			1,100.00	517.50	
		1,743.92	937.90	2,238.99		2,242.49	1,104.17	
			6,824.88	7,167.60		3,931.20	3,125.30	440.00
		1,898.57				2,136.06		
			2,157.62	6,436.21		5,499.87	502.07	
		8,242.49	6,873.93			10,859.55	7,008.07	
		1,419.01	1,592.00	1,013.53		2,024.41	1,337.03	
		457.09	942.60	1,109.63		1,656.60	762.17	
		7,998.97	13,161.49	19,086.59		5,970.00		
		93.35	212.67			74.65		
		33	76	38				
458.20	3,813.72	903.83	938.41	1,026.95		1,623.06	611.17	
		5,568.64	2,041.72	2,595.01		1,537.69	986.01	
		3,835.28	1,532.20	1,927.05		1,828.37	921.48	
		1,542.31	717.44	766.48		650.00	658.96	
			600.74	828.61		742.54	559.41	
		6,025.63	10,311.09	9,794.80		7,560.87	1,766.31	
				208.33				
		2,850.71	2,226.23	1,913.80		1,032.90		
	752.69	892.10	1,098.42	2,924.76		3,617.36	853.99	
		931.51	948.97	450.00		800.00	1,008.68	
					200.00			
						3,416.87		
2,602.20	10,087.56	86,824.60	89,379.78	105,600.66	8,724.64	109,886.83	46,494.21	6,475.31
4,598.00	27,635.88	137,783.52	123,513.33	146,819.58	11,536.34	136,031.80	59,795.53	4,975.26
7,774.44	14,509.46	139,754.15	132,054.94	146,319.85	13,352.98	158,023.34	62,323.21	2,600.00
10,673.68	15,403.86	155,505.30	143,365.84	159,574.53	12,264.11	176,104.55	65,312.50	3,832.58
12,645.79	12,045.81	138,915.41	140,225.79	147,553.69	15,474.57	174,405.76	68,793.94	1,842.47
21,546.70	13,341.86	122,051.67	131,251.46	144,157.74	9,126.79	150,995.94	74,247.84	

TABLE 7.—*Expenditures of funds from sources within States to offset expenditures supplementary thereto for cooperative extension work in each State, Alaska, and Hawaii*

State	Clothing	Home management	Horticulture	Botany and plant pathology	Entomology, apiculture, ornithology	Rodent pests	Forestry
Alabama.....	\$1, 214. 35	\$1, 278. 75	\$2, 932. 28		\$21. 40		
Arizona.....			25. 30				
Arkansas.....							
California.....							
Colorado.....	376. 00	2, 022. 31	2, 776. 00		833. 32		
Connecticut.....	1, 086. 93	2, 281. 19	3, 381. 18		387. 99		\$441. 66
Delaware.....				\$58. 61	95. 36		
Florida.....		798. 28	451. 73	451. 67	451. 67		
Georgia.....	2, 954. 84	2, 480. 31	1, 345. 31				3, 018. 26
Idaho.....	628. 79		2, 736. 15		832. 71		
Illinois.....							
Indiana.....							
Iowa.....	872. 24	2, 450. 53	2, 669. 01	2, 099. 53	3, 196. 33		
Kansas.....	1, 097. 93	2, 416. 94	2, 895. 15	1, 751. 07	2, 203. 03		
Kentucky.....	3, 205. 00	1, 624. 00	6, 262. 50				
Louisiana.....			3, 063. 58		815. 59		
Maine.....	2, 890. 21	2, 997. 09	2, 099. 97				2, 913. 02
Maryland.....	1, 073. 22		1, 893. 59	34. 78	100. 00		
Massachusetts.....	1, 415. 00	2, 350. 00	4, 264. 72	1, 500. 00			
Michigan.....	2, 625. 72	5, 538. 76	10, 013. 17	526. 99	1, 012. 98		
Minnesota.....				590. 00	958. 00		780. 21
Mississippi.....	225. 00	270. 00	595. 50				764. 82
Missouri.....	1, 541. 16	1, 715. 57	1, 260. 75		1, 434. 07		
Montana.....	483. 75	625. 00					
Nebraska.....	752. 68	3, 048. 79	574. 02		631. 42		
Nevada.....							
New Hampshire.....							
New Jersey.....	2, 716. 00		8, 753. 28				
New Mexico.....			1, 457. 15				
New York.....							
North Carolina.....	665. 07	500. 13	2, 615. 71		1, 352. 18		1, 283. 55
North Dakota.....							
Ohio.....	3, 338. 96	3, 569. 40	9, 381. 55		1, 171. 60		
Oklahoma.....	358. 54	9. 34	1, 683. 99		13. 84		
Oregon.....	748. 10		988. 50				
Pennsylvania.....			17, 600. 45	6, 800. 00	19, 264. 85		4, 061. 91
Rhode Island.....			247. 50				
South Carolina.....			9. 27		. 60		
South Dakota.....		655. 47	511. 74		511. 73		
Tennessee.....	403. 17		576. 04				568. 48
Texas.....	921. 48	921. 48	1, 826. 37		1, 826. 36		
Utah.....	1, 735. 65	591. 28					
Vermont.....	565. 21	661. 04					51. 53
Virginia.....	853. 98	872. 72	13, 742. 83	3, 184. 40			315. 15
Washington.....							
West Virginia.....			9, 778. 28	1, 558. 08			8. 00
Wisconsin.....	1, 140. 65	1, 436. 52	3, 968. 23	1, 563. 45			
Wyoming.....	800. 00						
Alaska.....							
Hawaii.....							
Puerto Rico.....							
Total, 1934.....	36, 689. 63	41, 114. 90	122, 380. 80	20, 118. 58	37, 115. 03		14, 206. 59
1933.....	52, 514. 28	54, 761. 99	143, 582. 17	28, 539. 31	41, 944. 30		11, 448. 66
1932.....	67, 239. 90	59, 779. 89	150, 787. 70	24, 507. 35	40, 798. 00		15, 226. 82
1931.....	80, 884. 51	57, 737. 35	147, 242. 89	22, 503. 64	40, 131. 46		19, 692. 97
1930.....	85, 232. 66	50, 422. 59	141, 195. 63	24, 481. 81	44, 897. 92	\$181. 14	21, 253. 37
1929.....	59, 241. 35	47, 665. 12	133, 436. 31	28, 446. 72	48, 374. 74	1, 414. 53	15, 662. 85

from the Federal appropriation of May 8, 1914 (Smith-Lever) and from appropriations for the year ended June 30, 1934, by projects, and totals for 1929-33—Continued

Agricultural engineering	Rural organization	Agricultural economics			Exhibits and fairs	Information	Miscellaneous specialists	Unexpended balance
		Farm management	Marketing	General				
\$2,345.35	-----	\$1,025.36	\$2,050.74	\$1,136.66	-----	\$1,859.63	-----	-----
	\$1,306.59	65.08	306.58					
1,978.64		4,054.66	3,276.52			7,051.48		
	732.36	1,220.64	1,953.04	976.52		329.20		
688.45			1,899.35					
386.53	1,642.46	3,318.45	5,424.45		\$1,159.47	915.28		
2,290.35	333.32	858.04	1,059.97			3,654.24		
3,006.45	540.00	3,240.00	3,050.33			2,608.00		
3,457.58	3,210.90	1,363.37	2,930.68			2,251.83		
3,003.06								
			819.00			296.01		
1,975.00		3,312.50	2,755.39			2,651.36		
3,882.25		5,461.34	8,412.27			4,279.52		
						2,167.00		
464.25	559.58	284.00	568.00	568.00		374.33		
812.53		991.15	1,542.97			531.23		
		1,080.00	583.75	662.86				
3,956.13		1,291.14	384.42			2,676.63		
		643.79	643.78					
3,640.00								
				183.47		1,795.43		
445.23						5,597.05		
5,206.89		6,594.08	438.48			5,812.00		
2,924.03		1,140.34	49.87			528.50		
				3,368.30	438.45	843.94		
4,123.75		5,781.72	8,892.22			1,840.00		
				113.94				
						1,947.70		
332.59	199.50	1,315.01	1,036.70			2,159.90		
1,833.87		1,770.14	3,847.31			1,140.53		
				600.00				
11,098.52	5,357.27	83.70	139.49	195.29		2,915.29		
		224.33	71.81			158.33		
2,532.23	2,756.25			1,100.00		4,857.60		
	4,631.80	390.21	3,798.20			7,484.37		
		1,356.91						
60,383.68	21,270.03	46,865.96	55,945.32	8,905.04	1,597.92	68,726.38		
73,687.00	21,637.66	72,842.25	124,684.83	732.34	3,989.14	85,193.06	\$898.86	\$207,607.95
71,852.54	7,434.87	70,763.33	74,435.51	27,091.19	2,958.19	91,434.98	321.88	45,489.20
70,459.53	12,945.12	80,231.19	91,766.60		5,138.04	118,090.61		32,853.76
66,834.61	17,112.30	62,005.86	79,638.39		422.51	119,696.52		20,050.37
71,945.83	18,640.62	49,865.75	86,799.37		1,013.54	75,926.95		23,158.52

TABLE 8.—Expenditures of funds from all sources for cooperative agricultural
30, 1934, by sources of funds,

State	Grand total	Total Federal funds	Total within the States	Funds from Federal sources	
				U. S. Department of Agriculture	
				Farmers' co-operative demonstrations	Other
Alabama.....	\$537,480.99	\$303,491.48	\$233,989.51	\$24,761.35	
Arizona.....	124,450.24	84,397.22	40,053.02	8,232.45	\$2,400.00
Arkansas.....	400,684.90	242,589.68	158,095.22	23,223.29	
California.....	710,368.90	230,044.46	480,324.44	14,501.15	
Colorado.....	194,150.89	123,881.40	70,269.49	17,319.23	2,400.00
Connecticut.....	259,054.31	100,514.99	158,539.32	8,119.63	
Delaware.....	57,800.86	43,735.14	14,065.72	2,877.11	
Florida.....	299,912.29	147,352.17	152,560.12	15,612.19	
Georgia.....	582,347.92	334,192.60	248,155.32	24,774.01	
Idaho.....	193,974.84	98,570.68	95,404.16	15,692.67	2,075.00
Illinois.....	902,618.75	281,958.89	620,659.86	9,289.74	
Indiana.....	553,999.51	232,018.46	321,981.05	8,966.18	
Iowa.....	730,437.92	238,712.67	491,725.25	10,278.01	
Kansas.....	565,529.38	196,632.02	368,897.36	8,121.49	
Kentucky.....	506,268.64	293,229.36	213,039.28	24,028.58	
Louisiana.....	447,228.53	222,927.96	224,300.57	23,932.30	
Maine.....	196,229.06	108,564.48	87,664.58	13,988.41	
Maryland.....	353,026.79	136,639.49	216,387.30	12,717.10	
Massachusetts.....	414,167.41	102,012.21	312,155.20	14,504.62	
Michigan.....	519,619.45	237,957.57	281,661.88	7,708.48	
Minnesota.....	414,345.63	200,795.76	213,549.87	11,205.87	
Mississippi.....	519,363.34	281,182.81	238,180.53	28,943.21	
Missouri.....	409,417.95	238,056.07	171,361.88	10,792.07	
Montana.....	233,409.37	118,051.00	115,358.37	18,073.87	7,287.33
Nebraska.....	316,749.32	171,119.33	145,629.99	10,163.88	3,861.33
Nevada.....	125,914.80	56,995.52	68,919.28	7,735.09	2,770.48
New Hampshire.....	194,342.85	73,368.98	120,973.87	12,706.73	
New Jersey.....	341,112.90	134,555.80	206,557.10	10,008.71	
New Mexico.....	146,648.51	91,182.47	55,466.04	14,887.53	
New York.....	1,391,035.87	296,088.04	1,094,947.83	8,494.22	
North Carolina.....	542,103.60	313,980.95	228,122.65	24,725.05	
North Dakota.....	216,686.16	123,474.36	93,211.80	17,036.11	
Ohio.....	667,613.54	306,041.17	361,572.37	8,272.68	
Oklahoma.....	477,543.32	260,053.42	217,489.90	21,512.85	
Oregon.....	293,451.71	122,598.16	170,853.55	15,444.09	4,440.00
Pennsylvania.....	783,301.70	390,197.82	393,103.88	81.75	
Rhode Island.....	57,532.02	40,586.43	16,945.59	5,658.21	
South Carolina.....	325,355.42	202,995.63	122,359.79	24,805.73	
South Dakota.....	184,824.85	117,312.02	67,512.83	15,791.12	1,980.00
Tennessee.....	487,883.84	287,597.28	200,286.56	24,733.19	
Texas.....	1,108,624.22	523,269.88	585,354.34	39,697.11	
Utah.....	142,692.24	86,969.07	55,723.17	12,785.40	2,400.00
Vermont.....	157,571.14	82,449.95	75,121.19	13,830.91	
Virginia.....	557,480.05	278,864.09	278,615.96	26,598.80	
Washington.....	210,579.04	137,131.31	73,447.73	15,894.76	
West Virginia.....	336,019.41	169,540.36	166,479.05	13,055.19	
Wisconsin.....	437,212.73	215,045.17	222,167.56	7,851.97	
Wyoming.....	126,256.74	74,458.31	51,778.43	11,969.92	2,400.00
Alaska.....	15,782.27	12,000.00	3,782.27		
Hawaii.....	70,747.22	49,780.36	20,966.86	3,690.47	
Puerto Rico.....	3,234.00	1,617.00	1,617.00		
Total, 1934.....	19,844,167.34	9,216,781.45	10,627,385.89	725,094.48	32,014.14
1933.....	21,976,841.08	9,410,053.31	12,566,787.77	865,635.74	38,839.45
1932.....	24,298,649.15	9,650,653.37	14,647,995.78	929,632.27	39,099.84
1931.....	25,448,859.30	9,674,345.28	15,774,514.02	939,265.78	36,794.99
1930.....	24,266,064.87	8,732,716.69	15,533,348.18	942,145.44	94,623.83
1929.....	22,870,026.76	8,412,090.30	14,457,936.46	952,935.37	356,671.43

extension work in States, Alaska, Hawaii, and Puerto Rico for the year ended June and totals for 1929-33

Funds from Federal sources—Continued				Funds from within States		
Clarke-McNary	Smith-Lever	Capper-Ketcham	Additional cooperative	State and college	County	Farmers' organizations, etc.
\$1,620.00	\$210,509.52	\$37,600.61	\$29,000.00	\$107,648.84	\$126,340.67	-----
-----	40,120.78	22,643.99	11,000.00	21,824.90	18,211.21	\$16.91
-----	156,299.47	28,066.92	35,000.00	56,227.70	101,867.52	-----
1,620.00	169,888.40	34,034.91	10,000.00	322,896.17	157,428.27	-----
-----	64,388.02	24,774.15	15,000.00	29,199.75	41,069.74	-----
909.21	60,089.34	24,396.81	7,000.00	97,535.62	40,650.00	20,353.70
-----	20,674.15	20,183.88	-----	13,206.23	859.49	-----
-----	84,684.24	26,555.74	20,500.00	75,367.54	77,192.58	-----
1,575.00	222,215.44	38,628.15	47,000.00	63,532.53	184,622.79	-----
1,620.00	43,263.19	22,919.82	13,000.00	58,249.50	37,154.66	-----
1,620.00	220,308.68	30,338.57	20,401.90	108,910.67	4,860.33	506,888.86
1,620.00	162,082.56	33,549.72	26,000.00	146,384.42	154,378.41	21,218.22
379.15	167,252.02	33,803.49	27,000.00	183,544.73	225,080.52	83,100.00
-----	131,357.81	30,652.72	26,500.00	103,382.99	202,073.06	63,441.31
-----	201,399.81	36,800.97	31,000.00	120,000.00	88,200.78	4,838.50
1,080.00	143,681.20	31,734.46	22,500.00	100,769.08	123,531.49	-----
-----	60,172.00	24,404.07	10,000.00	54,553.64	26,979.10	6,131.84
1,619.86	79,225.92	26,076.61	17,000.00	146,951.00	57,083.00	12,353.30
1,551.63	54,086.11	23,869.85	8,000.00	92,350.14	219,805.06	-----
1,620.00	172,375.83	34,253.26	22,000.00	162,824.49	118,387.39	-----
1,620.00	134,485.11	31,067.67	22,417.11	106,180.05	102,462.76	4,907.06
1,620.00	186,156.67	35,462.93	29,000.00	63,168.67	168,766.86	6,245.00
-----	156,882.37	36,381.63	34,000.00	50,204.01	121,157.87	-----
799.92	47,590.23	23,299.65	21,000.00	42,823.37	72,535.00	-----
1,620.00	104,021.01	28,253.11	23,200.00	65,527.43	80,102.56	-----
-----	15,966.24	20,523.71	10,000.00	9,954.38	58,934.90	-----
1,620.00	30,263.53	21,778.72	7,000.00	71,211.21	49,762.66	-----
1,534.50	84,015.55	26,497.04	12,500.00	79,849.80	124,432.14	2,275.16
-----	43,366.08	22,928.86	10,000.00	36,294.94	18,208.44	962.66
1,620.00	223,381.30	39,072.69	23,519.83	515,741.86	560,344.00	18,861.97
1,620.00	214,792.82	41,843.08	31,000.00	58,505.50	169,617.15	-----
1,193.50	61,749.72	24,061.03	19,434.00	6,039.95	48,389.87	38,781.98
1,440.00	235,531.47	39,797.02	21,000.00	195,792.66	165,779.71	-----
-----	175,971.67	34,568.90	28,000.00	103,595.94	113,893.96	-----
-----	58,919.91	24,294.16	19,500.00	80,488.55	82,226.84	8,138.16
1,260.00	330,189.10	48,666.97	10,000.00	254,886.33	138,217.55	-----
-----	13,996.39	20,481.83	450.00	1,771.00	13,707.22	1,467.37
-----	117,933.53	32,656.37	27,600.00	106,390.50	15,969.29	-----
1,620.00	59,540.90	20,000.00	20,000.00	41,758.43	25,754.40	-----
1,620.00	191,327.29	35,916.80	34,000.00	91,410.67	108,875.89	-----
1,620.00	372,162.37	51,790.40	58,000.00	233,861.95	336,782.68	14,709.71
1,080.00	35,468.10	22,235.57	13,000.00	29,213.10	26,510.07	-----
-----	35,390.30	22,228.74	11,000.00	31,200.00	39,581.72	4,339.47
1,620.00	182,503.07	35,142.22	33,000.00	187,476.71	85,208.89	5,930.36
-----	81,101.97	24,134.58	16,000.00	4,212.90	69,109.71	125.12
1,534.50	118,847.55	26,104.21	9,998.91	95,810.71	70,668.34	-----
1,620.00	154,232.95	30,734.61	20,605.64	97,936.17	121,131.39	3,100.00
1,260.00	26,389.71	21,438.68	11,000.00	25,541.85	26,236.58	-----
-----	12,000.00	-----	-----	3,782.27	-----	-----
-----	25,942.25	20,147.64	-----	20,966.86	-----	-----
1,617.00	-----	-----	-----	1,617.00	-----	-----
44,754.27	5,994,193.65	1,446,597.52	974,127.39	4,778,604.71	5,020,594.52	828,186.66
60,370.93	6,039,834.67	1,458,159.68	947,212.84	6,146,294.51	5,623,467.93	797,025.33
60,444.25	6,157,730.01	1,479,596.91	984,150.09	6,919,826.62	6,628,514.35	1,099,654.81
59,552.05	6,190,821.58	1,476,046.91	971,863.97	7,501,249.84	7,109,483.02	1,163,781.16
55,218.21	6,182,049.18	1,458,680.03	-----	7,172,266.60	7,099,140.59	1,261,940.99
51,688.37	6,159,777.48	891,017.65	-----	6,533,642.12	6,729,270.85	1,195,023.49

TABLE 9.—Total expenditures of funds from all sources for cooperative agricultural extension work in States, Alaska, Hawaii, and Puerto Rico for the year ended June 30, 1934, by items of expense, and totals for 1929-33

State	Total appropriation	Personal services—salaries and labor	Printing, binding and publications	Supplies and materials	Communication service	Transportation of things	Heat, light, water, and power	Equipment	Travel expenses	Miscellaneous
Alabama	\$537,480.99	\$419,432.65	\$3,764.09	\$12,494.14	\$3,973.38	\$2,277.94	\$304.08	\$5,440.07	\$87,304.87	\$2,489.77
Arizona	124,450.24	97,529.76	1,252.69	3,492.55	2,162.39	122.58	111.65	371.27	17,926.92	1,480.43
Arkansas	400,684.90	320,207.80	2,722.50	10,988.07	3,847.02	378.00		7,363.00	43,455.23	1,743.28
California	710,308.90	582,941.60		23,075.66	11,389.87	819.25	772.49	3,722.81	80,158.81	7,493.41
Colorado	131,318.09	131,318.09	2,015.63	7,841.40	4,589.17	370.94	8.35	936.38	43,887.60	3,183.43
Connecticut	269,054.31	181,776.74	3,268.77	11,891.15	8,487.46	341.15	47.83	3,700.32	40,660.88	9,444.01
Delaware	97,800.86	42,059.56	1,010.09	2,634.00	1,332.73	35.44		1,065.37	9,692.55	64.12
Florida	299,912.29	261,557.45	2,006.46	7,824.37	1,213.10	436.40	118.04	1,853.41	24,231.73	671.33
Georgia	582,347.92	511,429.01	5,005.34	12,768.98	2,257.83	608.88	2	5,774.70	41,492.33	828.85
Idaho	193,974.84	132,028.50	9,929.03	8,770.36	3,422.32	1,050.50	90.90	8,378.74	37,377.18	1,927.31
Illinois	902,618.75	554,350.80	8,137.05	46,579.13	39,334.74	2,629.23	10,450.23	40,251.61	70,122.14	121,763.92
Indiana	553,999.51	441,367.33	2,593.84	14,586.59	4,913.22	514.84	285.34	3,479.06	78,521.31	7,737.98
Iowa	730,437.92	498,118.71	13,063.90	39,168.51	20,006.87	5,009.73	4,129.48	9,206.17	100,603.64	40,631.01
Kansas	565,529.38	376,644.49	8,083.87	28,927.80	21,881.37	1,061.86	641.53	24,551.69	67,822.04	43,194.83
Kentucky	447,228.53	379,240.77	1,817.20	4,627.30	3,024.09	661.33	3,753.37	578.66	51,500.90	1,531.50
Louisiana	196,229.06	136,522.61	1,566.35	5,739.39	2,375.96	232.61	1,294.50	3,945.28	51,733.66	1,799.10
Maine	353,026.79	274,493.80	2,914.07	10,160.80	4,977.93	381.52	1,486.32	2,204.59	36,993.04	1,936.90
Maryland	310,490.35	232,392.50	1,525.45	11,923.80	4,750.88	1,455.85	752.66	1,569.44	52,585.14	2,571.15
Massachusetts	414,167.41	310,490.35	2,392.50	8,555.45	2,868.59	249.74		3,552.98	62,888.28	32,688.28
Michigan	398,704.71	315,650.57	9,507.31	13,500.29	9,506.36	260.04		2,565.29	91,131.41	1,020.51
Minnesota	414,345.63	315,650.57	3,381.40	15,885.53	9,506.36	924.91	251.07	2,841.59	62,580.18	3,324.02
Mississippi	519,363.34	461,481.85	1,615.07	11,506.37	3,884.50	1,246.77	913.99	2,630.77	33,648.42	2,435.40
Missouri	409,417.95	314,483.67	3,162.57	21,838.01	9,384.41	1,738.51	412.61	7,130.58	48,836.47	3,431.12
Montana	293,409.37	187,820.63	2,462.13	3,689.42	1,294.83	259.73	710.51	577.63	36,557.25	37.24
Nebraska	316,749.32	241,454.57	2,370.61	12,364.12	6,314.47	232.15	266.57	6,183.86	40,088.64	6,932.19
Nevada	125,914.80	91,082.43	146.88	5,305.52	4,174.42	232.15	98.65	4,722.22	19,177.00	876.88
New Hampshire	194,342.85	136,219.98	2,962.23	7,555.03	3,563.68	573.10	700.00	1,863.18	36,999.17	3,916.48
New Jersey	341,112.90	263,870.50	1,929.87	12,470.15	6,035.96	795.64	1,021.00	19,469.83	31,647.71	3,872.24
New Mexico	446,648.51	99,640.10	1,678.86	3,559.08	3,248.68	400.71		2,696.87	34,355.76	1,063.45
New York	1,391,035.87	907,606.13	56,082.61	66,167.56	42,666.77	832.74	49,357.50	51,872.13	151,484.53	64,965.90
North Carolina	542,103.66	420,104.20	2,360.67	11,399.60	5,077.46	424.97	1,262.34	5,804.66	93,051.90	4,908.34
North Dakota	216,686.16	158,467.52	1,841.16	9,292.90	5,277.66	645.16	3,730.19	5,081.04	31,644.19	706.34
Ohio	667,613.54	500,685.14	13,676.30	20,655.94	10,003.52	1,223.02	107.82	6,197.04	100,573.97	4,490.79
Oklahoma	477,543.32	408,988.45	5,397.50	16,805.20	6,391.64	481.69		1,844.76	36,528.75	1,105.43
Oregon	293,451.71	211,161.43	2,378.42	12,294.61	7,137.38	1,024.63	267.12	12,067.86	42,252.68	4,927.88
Pennsylvania	783,301.70	572,871.54	3,206.16	11,909.31	15,029.36	336.82	1,612.32	2,264.17	142,655.22	33,416.80
Rhode Island	57,532.02	43,023.59	3,037.08	3,037.08	971.59	72.91	8.93	1,878.30	8,004.01	2,113.51
South Carolina	325,355.42	283,120.08	816.07	8,097.94	7,467.09	369.21	118.22	1,410.18	20,060.87	3,896.76
South Dakota	184,824.85	126,573.43	2,108.23	12,931.93	5,132.45	417.52	15.85	3,314.70	33,684.78	3,565.96
Tennessee	487,883.84	428,507.86	2,264.77	11,538.25	3,238.93	269.02	47.62	5,589.99	31,610.11	4,817.29
Texas	1,108,624.22	1,030,917.43	7,620.39	9,736.00	4,428.89	633.98		2,590.03	50,051.23	2,646.22

Utah.....	142,692.34	99,947.62	1,422.74	3,059.85	848.47	181.34	-----	950.37	36,126.38	155.47
Vermont.....	157,571.14	113,746.63	9,719.65	6,079.67	2,573.39	208.18	760.46	1,698.15	27,474.56	4,310.45
Virginia.....	557,480.05	423,223.38	9,897.59	10,418.54	4,999.44	435.82	267.27	11,173.53	94,985.28	2,079.20
Washington.....	210,579.04	162,747.08	4,268.67	7,700.58	4,113.76	739.44	8.66	2,688.66	27,752.80	565.39
West Virginia.....	336,019.41	270,566.33	5,306.38	21,154.22	4,185.57	238.93	1,993.17	4,829.27	27,053.77	671.77
Wisconsin.....	437,212.73	366,262.81	6,614.84	5,608.85	1,601.85	49.73	-----	1,732.80	55,341.85	-----
Wyoming.....	126,236.74	86,810.52	581.55	4,115.32	1,998.65	250.01	38.69	328.62	29,113.38	4,000.00
Alaska.....	15,782.27	11,994.00	-----	312.46	19.86	1.70	-----	91.90	3,362.35	-----
Hawaii.....	70,747.22	51,562.42	-----	2,990.24	1,053.38	89.04	-----	482.37	12,468.53	324.45
Puerto Rico.....	3,234.00	3,234.00	1,776.79	-----	-----	-----	-----	-----	-----	-----
Total, 1934.....	19,844,167.34	15,301,148.50	213,666.81	634,972.02	328,366.83	34,349.80	90,407.33	302,634.80	2,488,269.24	450,352.01
1933.....	21,976,841.08	17,270,232.51	308,498.89	590,488.01	297,751.47	32,107.68	87,879.83	171,009.08	2,521,981.83	696,891.78
1932.....	24,298,649.15	18,881,463.69	322,413.14	700,070.58	315,232.22	36,251.53	100,639.59	305,586.89	2,935,188.37	701,833.44
1931.....	25,448,859.30	19,379,177.80	367,828.07	782,771.15	347,465.04	40,868.71	103,654.58	340,782.07	3,366,684.40	719,627.48
1930.....	24,266,064.87	18,452,348.84	337,789.84	688,502.17	319,015.28	39,901.62	94,528.10	314,177.67	3,203,502.69	756,238.76
1929.....	22,870,026.76	17,035,051.12	342,182.63	640,033.93	297,314.16	40,943.53	88,198.90	384,080.53	3,451,340.68	590,881.28

TABLE 10.—*Expenditures of funds from all sources for cooperative agricultural 30, 1934, by projects, and*

State	Total	Adminis- tration	Printing and distri- bution of pub- lications	County agent work	Home dem- onstration work	Boys' and girls' club work
Alabama.....	\$537,480.99	\$15,152.81	\$4,645.71	\$272,873.30	\$157,544.95	\$11,403.65
Arizona.....	124,450.24	9,857.50	1,252.69	63,402.14	20,751.13	3,433.95
Arkansas.....	400,684.90	17,236.18	5,501.39	177,506.09	150,942.13	8,133.09
California.....	710,368.90	12,017.47 ¹		438,436.92	126,430.03	18,457.52
Colorado.....	194,150.89	9,114.25	2,240.45	90,649.17	21,102.59	5,552.80
Connecticut.....	259,054.31	15,112.09	92.25	56,380.93	36,805.60	56,374.08
Delaware.....	57,800.86	8,460.08	892.49	14,957.45	14,250.22	13,437.02
Florida.....	299,912.29	8,092.01	3,247.74	132,746.38	100,285.48	6,451.55
Georgia.....	582,347.92	41,432.06	11,852.31	293,973.78	166,485.87	8,277.51
Idaho.....	193,974.84	8,133.07	1,035.23	91,371.50	23,911.16	6,520.84
Illinois.....	902,618.75	27,719.30	9,651.25	643,331.35	123,117.02	26,019.81
Indiana.....	553,999.51	25,429.51	2,478.62	269,457.05	33,298.16	87,734.12
Iowa.....	730,437.92	59,866.89	6,363.93	420,589.16	38,154.40	26,124.81
Kansas.....	565,529.38	30,342.80	1,570.49	330,019.11	67,203.68	21,164.49
Kentucky.....	506,268.64	21,449.79	4,519.32	284,011.25	77,811.38	31,769.40
Louisiana.....	447,228.53	29,668.68	1,717.20	225,431.17	127,244.66	15,449.08
Maine.....	196,229.06	17,135.78	1,566.35	65,405.20	48,834.82	23,410.89
Maryland.....	353,026.79	14,721.67	4,259.53	116,245.18	87,887.52	6,592.50
Massachusetts.....	414,167.41	15,328.76	3,359.61	104,990.42	78,237.94	113,026.13
Michigan.....	519,619.45	10,460.80	10,077.45	261,088.51	19,500.45	57,312.57
Minnesota.....	414,345.63	18,545.95	5,747.43	220,703.63	32,667.06	50,375.92
Mississippi.....	519,363.34	38,959.00	1,822.07	218,448.19	154,448.37	17,061.03
Missouri.....	409,417.95	15,338.70	4,249.28	274,128.52	33,182.61	13,805.81
Montana.....	233,409.37	13,474.24	2,664.88	123,244.39	32,916.89	7,535.61
Nebraska.....	316,749.32	16,183.22	3,250.93	156,765.80	31,636.55	18,285.24
Nevada.....	125,914.80	10,023.29	429.97	76,285.11	26,488.24	-----
New Hampshire.....	194,342.85	11,640.51	1,829.22	49,140.61	36,161.62	49,741.55
New Jersey.....	341,112.90	16,493.39	3,410.12	122,041.63	58,324.13	53,084.09
New Mexico.....	146,648.51	11,143.22	2,378.86	79,126.55	26,443.96	-----
New York.....	1,391,035.87	127,872.67	56,082.61	412,974.18	231,505.01	190,035.17
North Carolina.....	542,103.60	27,186.57	3,388.20	285,939.11	148,811.53	4,043.36
North Dakota.....	216,686.16	11,633.42	3,138.10	136,358.30	18,575.66	11,440.53
Ohio.....	667,613.54	32,890.40	17,133.03	308,678.06	65,244.78	51,020.11
Oklahoma.....	477,543.32	25,596.82	7,438.58	210,140.84	159,695.77	12,335.05
Oregon.....	293,451.71	17,472.10	2,352.38	151,571.47	27,227.12	39,916.50
Pennsylvania.....	783,301.70	58,311.03	2,974.84	368,840.58	137,175.59	24,958.57
Rhode Island.....	57,532.02	3,016.13	505.91	14,513.67	14,338.37	16,719.36
South Carolina.....	325,355.42	24,395.29	1,345.38	154,854.86	105,039.43	7,135.29
South Dakota.....	184,824.85	13,022.21	5,068.91	75,414.30	37,603.63	17,349.93
Tennessee.....	487,883.84	18,097.84	2,264.77	275,174.77	115,339.10	4,281.50
Texas.....	1,108,624.22	36,010.07	15,700.37	618,081.53	351,827.21	3,517.15
Utah.....	142,692.24	20,017.36	1,430.21	64,791.08	23,129.62	6,337.12
Vermont.....	157,571.14	15,120.49	719.65	45,274.87	33,703.92	39,351.16
Virginia.....	557,480.05	35,936.16	11,029.33	276,213.67	109,999.00	5,423.07
Washington.....	210,579.04	15,624.53	5,377.04	126,123.65	23,982.12	14,701.72
West Virginia.....	936,019.41	20,864.57	7,012.44	119,300.54	50,469.44	72,505.16
Wisconsin.....	437,212.73	14,229.38	11,350.90	206,105.53	19,101.63	39,511.67
Wyoming.....	126,236.74	12,822.07	581.55	59,240.06	21,461.06	6,289.12
Alaska.....	15,782.27	1,339.33	-----	4,980.77	4,551.38	-----
Hawaii.....	70,747.22	9,140.08	1,509.04	23,193.35	25,054.83	-----
Puerto Rico.....	3,234.00	-----	-----	-----	-----	-----
Total, 1934.....	19,844,167.34	1,089,134.54	258,509.98	9,610,515.68	3,675,904.82	1,323,486.65
1933.....	21,976,841.08	1,273,621.23	328,555.12	10,264,949.45	4,048,793.31	1,524,012.10
1932.....	24,298,649.15	1,245,641.92	364,305.05	11,464,026.65	4,520,791.25	1,636,907.05
1931.....	25,448,859.30	1,297,040.57	362,476.02	12,140,511.56	4,727,620.07	1,645,661.69
1930.....	24,266,064.87	1,269,097.46	350,073.66	11,877,946.25	4,494,923.83	1,535,225.60
1929.....	22,870,026.76	1,168,404.66	351,405.12	11,279,965.61	4,120,553.14	1,400,350.13

extension work in States, Alaska, Hawaii, and Puerto Rico for the year ended June totals for 1929-33

Home-economics specialists	Extension schools	Animal husbandry	Poultry	Dairying	Animal diseases	Agronomy	Foods and nutrition
	\$3,775.30	\$15,054.58	\$1,544.72			\$2,686.20	\$8,296.79
		4,891.96	1,976.11	\$1,791.55		3,009.94	
		3,532.75	3,082.53	369.50		4,390.93	5,500.58
	3,896.00	4,696.00	5,060.00	5,600.00	\$4,820.00	4,734.00	4,886.00
	194.94	8,127.96	3,583.36	4,982.34	2,950.84	5,987.50	3,461.38
\$3,445.21	405.78	2,547.55	12,679.33	10,576.34		5,569.69	3,774.43
			1,003.45				3,416.94
	595.31	2,162.25	9,881.44	5,255.13			7,077.45
		2,147.06	4,480.71	5,598.80		7,287.82	6,645.27
		4,554.60	4,873.41	5,580.56		20,806.35	
		4,842.15	3,404.31	6,684.66	1,795.42	9,171.46	5,622.84
	28,030.71	12,636.12	9,416.40	12,606.11	2.10	9,454.05	5,006.70
	2,282.08	8,661.03	6,680.98	27,596.97	2,398.57	9,896.86	7,949.47
3,152.51	19,717.34	6,502.12	7,078.26	7,420.43	3,080.72	9,663.11	4,881.27
	3,625.10	9,123.22	9,294.67	7,220.08	3,719.56	8,338.92	3,764.24
		5,443.63		3,989.37		7,883.99	
			3,442.14	3,539.05		2,099.98	2,850.31
	8,631.45	4,311.79	4,179.95	11,186.51		4,168.99	3,044.51
	3,682.09	4,542.44	3,169.84	7.35		5,117.42	5,867.01
	418.81	8,443.42	8,438.75	12,723.03	4,856.96	23,120.05	3,490.18
		8,276.10	3,469.43	12,395.25	3,812.82	7,865.23	6,999.82
		4,925.18	8,124.49	8,590.20			7,540.92
	215.49	7,345.17	3,799.67	7,401.24	1,304.41	13,901.05	3,084.90
	754.97	4,100.95	4,326.57	2,686.69	985.84	4,804.04	3,547.96
		6,490.87	6,920.45	6,436.77		8,740.68	5,115.70
	845.06		4,738.57	6,104.01		969.59	3,321.14
			11,669.19	11,491.69		5,162.96	5,676.30
		4,441.82	3,427.43	4,200.35		4,994.06	
10,506.39	43,708.79	41,690.38	39,065.88	5,945.44		26,721.67	8,334.46
			6,735.07	16,612.70		10,087.16	2,704.32
		7,189.62	3,241.17	3,733.48		182.20	2,936.44
	27,057.67	19,095.89	13,489.14	2,687.69		18,566.88	7,449.73
		4,963.97	4,925.58	5,282.60		6,421.92	3,587.73
		3,376.21	4,136.03	3,292.23		9,084.65	3,174.83
		16,098.56	18,973.46	33,499.56		11,776.21	3,970.39
		1,378.51	2,687.02			413.10	
1,425.26		4,037.32	4,253.18	1,426.90		3,357.06	1,710.00
		2,953.99	3,420.05	3,424.61		4,292.21	2,871.95
2,969.20	4,856.55	12,372.89	5,705.62	8,004.36		3,794.69	3,267.51
		16,313.91	8,276.36	7,551.84		4,286.87	3,504.86
		4,100.79	3,186.32	1,276.48		3,308.36	2,846.80
			3,753.24	4,482.42		2,746.16	1,736.93
		9,684.18	11,026.13	14,015.21		8,488.65	6,242.73
		1,680.90	4,005.65	904.64		3,327.63	46.14
		6,338.14	4,740.37	6,204.70	3,000.73	3,612.90	
	2,752.69	14,433.33	8,660.52	22,267.05		19,453.67	3,469.07
		2,457.85	3,730.72	1,976.34		1,934.09	3,265.20
			2,154.97		4,910.79	3,499.90	
24,794.36	155,446.13	315,866.16	305,912.64	334,622.23	37,638.76	335,180.85	181,941.20
30,659.07	206,836.46	382,261.69	351,338.12	378,878.59	42,040.07	384,245.28	198,934.40
41,802.30	238,038.81	400,190.14	387,298.80	466,049.32	44,614.98	441,247.78	210,592.97
39,998.72	239,317.44	420,976.34	415,569.53	467,972.33	46,176.23	497,430.47	218,131.51
40,623.21	243,694.77	391,635.93	400,192.47	450,245.19	47,797.10	476,428.37	220,087.59
47,831.56	237,137.84	388,537.55	366,053.25	417,105.39	33,525.56	451,252.19	209,793.47

TOTAL 10.—Expenditures of funds from all sources for cooperative agricultural
1934, by projects, and

State	Child care and train- ing	Clothing	Home manage- ment	Horticul- ture	Botany and plant pa- thology	Entomol- ogy, api- culture, orni- thology	Rodent pests
Alabama.....		\$4,080.55	\$3,970.05	\$7,000.98		\$23.65	
Arizona.....		3,201.72		2,720.07			
Arkansas.....		2,626.08	3,302.28	3,494.10			
California.....	\$4,810.00	4,635.00	4,232.00	5,789.00	\$4,471.00		
Colorado.....		2,729.86	2,979.92	4,596.70		1,462.08	
Connecticut.....		3,924.57	5,477.26	10,457.41		1,108.94	
Delaware.....					205.33	1,177.83	
Florida.....			3,759.28	1,523.07	1,523.00	1,523.00	
Georgia.....		7,107.08	5,148.42	3,698.76			
Idaho.....		3,477.26		5,992.29		2,206.71	\$4,555.09
Illinois.....	3,087.07	3,126.82	6,815.66	5,704.26			
Indiana.....		2,591.24	5,754.46	17,373.02	7,686.34	505.22	
Iowa.....	3,359.07	6,235.48	16,695.08	13,971.39	6,783.72	10,225.28	
Kansas.....		3,037.07	6,418.16	6,898.16	3,225.95	3,793.59	
Kentucky.....		6,449.09	3,398.80	10,774.80			
Louisiana.....				5,318.73		1,964.29	
Maine.....		2,890.21	2,997.09	2,099.97			
Maryland.....		3,130.49		13,369.45	9,939.20	30,269.70	
Massachusetts.....	4,475.43	5,059.38	9,060.97	14,032.68	4,479.26		
Michigan.....	3,921.97	4,246.09	9,362.68	19,091.15	2,236.44	2,280.89	
Minnesota.....	3,192.90	6,818.31	3,229.30	42.42	3,610.89	1,678.75	
Mississippi.....		3,519.33	3,880.56	8,411.57			
Missouri.....		3,718.16	7,033.31	5,303.76		2,019.74	
Montana.....		3,202.79	3,431.32	2,849.79	869.16	1,393.08	
Nebraska.....		2,601.74	10,539.04	3,515.69		2,672.50	
Nevada.....							
New Hampshire.....		2,929.84	3,508.02	3,381.30			
New Jersey.....	4,703.93	4,833.26	787.00	13,526.67			
New Mexico.....				4,278.54			
New York.....	5,001.72	11,622.40	14,430.94	33,972.00	18,678.46	12,717.88	
North Carolina.....		2,867.32	2,702.38	7,134.71		5,637.68	
North Dakota.....		3,699.58	2,859.05			3,336.91	
Ohio.....		7,228.88	14,259.96	13,846.20	5,267.73	6,617.74	
Oklahoma.....	2,929.95	1,294.17	3,147.53	4,462.66		3,278.42	
Oregon.....		3,080.18	3.36	5,008.29			4,609.81
Pennsylvania.....		3,448.58	3,624.57	22,076.07	15,501.25	21,119.65	
Rhode Island.....				2,028.01			
South Carolina.....		1,589.69		2,570.38		926.71	
South Dakota.....			2,969.88	1,659.58		1,659.57	
Tennessee.....		2,914.17		4,091.44			
Texas.....		3,926.22	6,798.08	7,008.99		4,414.49	
Utah.....		2,869.62	2,697.28				
Vermont.....		1,850.66	3,508.14	630.57			
Virginia.....		2,853.90	872.72	17,514.39	3,397.73		
Washington.....		2,757.62	4,004.01	655.57			
West Virginia.....				12,717.89			
Wisconsin.....		3,769.83	5,678.95	15,007.95	6,900.80		
Wyoming.....		3,360.80	1,701.00	1,357.55			
Alaska.....							
Hawaii.....							
Puerto Rico.....							
Total, 1934.....	35,482.04	155,305.04	191,038.51	346,957.98	94,776.31	124,014.30	9,164.90
1933.....	34,558.25	169,724.73	198,835.62	402,637.81	106,801.75	146,023.12	9,432.70
1932.....	28,431.97	188,604.42	206,393.53	463,623.95	106,860.53	156,613.52	9,171.19
1931.....	33,086.55	218,722.56	216,983.95	465,016.54	103,544.87	140,403.88	5,576.93
1930.....	33,999.43	213,407.38	191,773.64	406,934.30	97,890.94	144,076.29	7,605.62
1929.....	16,640.92	207,428.86	159,947.24	403,038.25	97,505.16	138,811.77	11,120.81

extension work in States, Alaska, Hawaii, and Puerto Rico for the year ended June 30, totals for 1929-33—Continued

Forestry	Agricultural engineering	Rural organization	Agricultural economics			Exhibits and fairs	Information	Miscellaneous specialists
			Farm management	Marketing	General			
\$3,023.92	\$7,800.10		\$3,254.76	\$6,007.87	\$3,982.14		\$5,358.96	
		\$4,278.16	3,883.32					
	756.58			9,966.39			4,344.30	
4,987.82	10,828.00		4,286.75	4,874.88	18,106.00	\$4,963.00		\$9,351.51
55.30		3,311.03	12,048.28	2,142.11			6,802.82	75.21
3,053.38	2,042.14		9,838.17	7,748.36		1,810.87	8,980.41	849.52
		1,726.92	2,975.52	4,602.44	2,301.22		3,723.00	430.10
9,132.11	2,942.73			6,136.63				
3,245.35			3,958.21	3,753.21				
3,030.67	3,130.47	1,711.23	7,740.19	169.80			3,447.22	
3,541.56	2,688.53		9,685.93	6,189.99			2,383.57	
1,178.35	2,538.46	6,224.03	11,988.63	14,102.08		2,982.73	11,748.16	5,840.84
	6,188.94	416.65	10,335.61	5,994.03			7,424.89	
	5,929.17	1,108.23	5,588.23	4,076.48			4,296.91	
	4,857.58	4,735.90	4,726.83	3,447.34			3,331.88	
2,018.20	3,003.06		5,825.02	3,622.31			4,593.86	
2,913.02	2,806.29		3,213.47	14,746.56	817.41		6,287.05	
3,217.57	5,034.44	3,230.00	9,433.52	7,756.34		1,534.77	9,793.25	
2,948.36	10,295.01		10,819.12	20,150.61			13,257.85	
4,026.66			6,990.22	5,864.79			8,050.53	
4,005.88	5,774.40	6,836.18	4,262.28	8,524.55	8,524.55		4,890.24	300.00
4,520.23	3,398.80	10.19	4,133.92	4,155.54			1,887.68	
	702.46		8,768.33	2,286.85	2,715.84		4,546.80	
1,599.92	10,747.33	3,582.29	11,934.57	2,334.83			5,697.89	
3,297.23			5,753.91	5,753.90			1,180.38	
4,389.79	1,125.27	1,790.08	4,431.08	4,452.59			3,843.00	
5,780.55	5,311.19		6,993.79	3,370.16			8,452.85	
					4,418.29		1,795.43	
5,983.81	16,322.44	6,719.91	21,534.81	21,534.82			28,174.03	
4,314.30	445.23	3,510.69	125.53	4,260.69			5,597.05	
2,233.45	724.67		1,658.66				3,744.87	
3,738.08	9,381.53	3,632.96	17,797.54	11,183.07			11,346.47	
	6,811.00		5,492.35	1,771.98			7,966.40	
					13,994.94	2,423.75	1,328.24	1,400.62
8,933.78	4,607.31		7,382.71	16,188.99			3,840.00	
					1,931.94			
			1,308.80	7,119.07			2,860.80	
	1,214.10	1,461.42	3,172.08	2,240.96			5,025.47	
3,599.15			6,955.08	10,500.07			3,695.13	
3,042.31	4,142.31	3,914.87		3,292.63			7,014.15	
2,101.51					3,079.69		1,520.00	
51.53			2,592.85	1,828.55			220.00	
3,345.90	11,131.87	5,357.27	3,922.11	6,536.86	9,151.60		5,337.57	
			2,111.96	2,331.90			2,943.96	
3,330.68		12,011.02	166.00		4,693.55		8,862.53	188.75
7,689.95	4,934.58	5,037.86	4,346.39	6,383.70			16,127.28	
2,601.00			3,458.33					
			6,195.05					
3,234.00								
124,165.32	157,615.99	80,606.89	261,089.91	257,404.93	73,717.17	13,715.12	251,722.88	18,436.05
153,804.09	183,801.81	70,072.75	317,280.47	437,415.22	13,848.70	14,229.16	265,259.13	37,990.88
166,289.54	194,573.76	67,053.26	321,037.68	395,860.21	121,206.97	15,459.63	255,936.88	140,025.09
170,398.23	203,424.47	73,096.82	349,747.89	433,232.24	11,924.68	21,592.42	382,311.80	100,912.99
145,660.00	193,270.46	77,860.54	236,353.27	243,600.06		16,941.20	351,309.78	107,410.53
132,198.86	224,054.27	65,241.47	201,569.58	230,684.48		18,747.26	358,461.40	132,661.46

TABLE 11.—*Sources of offset to Federal Smith-Lever and Capper-Ketcham funds for the fiscal year ended June 30, 1934, and totals for 1929-33*

State	Total appropriation	State and college	County	Farmers' organizations, etc.	Unexpended balance
Alabama.....	\$218, 110. 13	\$99, 357. 38	\$118, 752. 75	-----	-----
Arizona.....	32, 764. 77	18, 189. 23	14, 575. 54	-----	-----
Arkansas.....	168, 757. 07	56, 227. 70	98, 138. 69	-----	\$14, 390. 68
California.....	173, 923. 31	173, 923. 31	-----	-----	-----
Colorado.....	59, 162. 17	27, 500. 00	31, 662. 17	-----	-----
Connecticut.....	54, 486. 15	54, 486. 15	-----	-----	-----
Delaware.....	13, 214. 53	10, 853. 03	-----	-----	2, 356. 50
Florida.....	81, 239. 98	59, 713. 80	21, 526. 18	-----	-----
Georgia.....	230, 843. 59	60, 659. 93	170, 183. 66	-----	-----
Idaho.....	36, 183. 01	36, 183. 01	-----	-----	-----
Illinois.....	228, 769. 46	107, 500. 00	-----	\$113, 147. 25	8, 122. 21
Indiana.....	165, 432. 28	67, 683. 53	97, 748. 75	-----	-----
Iowa.....	171, 055. 51	66, 024. 99	105, 030. 52	-----	-----
Kansas.....	132, 010. 53	80, 000. 00	52, 010. 53	-----	-----
Kentucky.....	208, 200. 78	120, 000. 00	88, 200. 78	-----	-----
Louisiana.....	145, 415. 66	96, 248. 18	49, 167. 48	-----	-----
Maine.....	54, 576. 07	54, 553. 64	22. 43	-----	-----
Maryland.....	75, 302. 53	59, 628. 01	15, 674. 52	-----	-----
Massachusetts.....	47, 955. 96	47, 955. 96	-----	-----	-----
Michigan.....	176, 629. 09	134, 225. 61	42, 403. 48	-----	-----
Minnesota.....	149, 804. 98	82, 298. 29	51, 922. 11	1, 332. 38	14, 252. 20
Mississippi.....	191, 619. 60	59, 079. 43	132, 540. 17	-----	-----
Missouri.....	163, 264. 00	50, 113. 77	113, 150. 23	-----	-----
Montana.....	40, 889. 88	9, 951. 79	30, 938. 09	-----	-----
Nebraska.....	102, 274. 12	53, 251. 08	49, 023. 04	-----	-----
Nevada.....	6, 489. 95	6, 489. 95	-----	-----	-----
New Hampshire.....	22, 042. 25	22, 042. 25	-----	-----	-----
New Jersey.....	80, 512. 59	76, 508. 52	4, 004. 07	-----	-----
New Mexico.....	36, 294. 94	36, 294. 94	-----	-----	-----
New York.....	236, 932. 86	105, 493. 39	126, 960. 60	-----	4, 478. 87
North Carolina.....	247, 980. 01	57, 018. 75	169, 617. 15	-----	21, 344. 11
North Dakota.....	65, 082. 88	3, 500. 00	52, 310. 75	-----	9, 272. 13
Ohio.....	245, 328. 49	158, 913. 52	86, 414. 97	-----	-----
Oklahoma.....	180, 540. 57	89, 198. 57	91, 342. 00	-----	-----
Oregon.....	53, 214. 07	53, 214. 07	-----	-----	-----
Pennsylvania.....	355, 246. 55	236, 479. 99	112, 376. 08	-----	6, 390. 48
Rhode Island.....	4, 914. 65	1, 233. 81	3, 244. 41	-----	436. 43
South Carolina.....	120, 589. 90	104, 620. 61	15, 969. 29	-----	-----
South Dakota.....	59, 240. 90	39, 550. 00	9, 990. 90	-----	9, 700. 00
Tennessee.....	197, 244. 09	88, 771. 12	108, 472. 97	-----	-----
Texas.....	393, 952. 77	232, 439. 64	161, 513. 13	-----	-----
Utah.....	27, 703. 67	24, 183. 60	3, 520. 07	-----	-----
Vermont.....	27, 619. 04	27, 619. 04	-----	-----	-----
Virginia.....	187, 645. 29	169, 054. 67	18, 590. 62	-----	-----
Washington.....	1 75, 707. 82	3, 986. 32	69, 109. 71	-----	2, 611. 79
West Virginia.....	141, 934. 11	61, 926. 42	53, 025. 34	-----	26, 982. 35
Wisconsin.....	158, 844. 39	82, 836. 17	72, 131. 39	-----	3, 876. 83
Wyoming.....	17, 828. 39	17, 828. 39	-----	-----	-----
Alaska.....	2, 000. 00	2, 000. 00	-----	-----	-----
Hawaii.....	21, 500. 00	16, 089. 89	-----	-----	5, 410. 11
Total, 1934.....	6, 088, 275. 34	3, 402, 906. 45	2, 441, 264. 57	114, 479. 63	129, 624. 69
1933.....	7, 174, 335. 34	4, 231, 688. 65	2, 625, 152. 66	109, 886. 08	207, 607. 95
1932.....	7, 186, 966. 21	4, 480, 070. 07	2, 549, 862. 28	111, 544. 66	45, 489. 20
1931.....	7, 192, 436. 00	4, 624, 258. 91	2, 398, 625. 56	136, 697. 77	32, 853. 76
1930.....	6, 192, 936. 00	4, 257, 816. 84	1, 801, 530. 09	113, 538. 70	20, 050. 37
1929.....	5, 692, 936. 00	3, 846, 324. 87	1, 704, 904. 94	118, 547. 67	23, 158. 52

¹ The State of Washington was unable to offset \$2,140.52 of Federal expenditures during 1934 and returned \$1,070.26 to the Treasurer of the United States on Sept. 24, 1934.

State Extension Directors in Charge of Cooperative Extension Work²

Alabama: L. N. Duncan, Alabama Polytechnic Institute, Auburn.

Arizona: P. H. Ross, University of Arizona, Tucson.

Arkansas:

Dan T. Gray, director, College of Agriculture, University of Arkansas, Fayetteville.

O. C. Randall, acting assistant director, 524 Post Office Building, Little Rock.

California: B. H. Orocheron, College of Agriculture, University of California, Berkeley.

Colorado: F. A. Anderson, State Agricultural College of Colorado, Fort Collins.

Connecticut: B. W. Ellis, Connecticut State College, Storrs.

Delaware: O. A. McCue, University of Delaware, Newark.

Florida: Wilmon Newell, Agricultural Extension Service, Experiment Station, Gainesville.

Georgia: Harry L. Brown, Georgia State College of Agriculture, Athens.

Idaho: E. J. Iddings, College of Agriculture, University of Idaho, Moscow.

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Maine: A. L. Deering, College of Agriculture, University of Maine, Orono.

Maryland: T. B. Symons, University of Maryland, College Park.

Massachusetts: W. A. Munson, Massachusetts State College, Amherst.

Michigan: R. J. Baldwin, Michigan State College of Agriculture and Applied Science, East Lansing.

Minnesota: W. O. Coffey, acting director, Department of Agriculture of the University of Minnesota, University Farm, St. Paul.

Mississippi: J. R. Ricks, Mississippi State College, State College.

Missouri: R. R. Thomasson, assistant director, College of Agriculture, University of Missouri, Columbia.

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Nebraska: W. H. Brokaw, College of Agriculture, University of Nebraska, Lincoln.

Nevada: O. W. Creel, College of Agriculture, University of Nevada, Reno.

New Hampshire: J. C. Kendall, University of New Hampshire, Durham.

New Jersey: H. J. Baker, State College of Agriculture and Mechanic Arts of Rutgers University, New Brunswick.

New Mexico: G. R. Quesenberry, New Mexico College of Agriculture and Mechanic Arts, State College.

New York: L. R. Simons, New York State College of Agriculture, Ithaca.

North Carolina: I. O. Schaub, State College Station, Raleigh.

North Dakota: H. L. Walster, North Dakota Agricultural College, State College Station, Fargo.

Ohio: H. O. Ramsower, College of Agriculture, Ohio State University, Columbus.

Oklahoma: D. P. Trent, Director, Oklahoma Agricultural and Mechanical College, Stillwater.

Oregon: W. A. Schoenfeld, Oregon State Agricultural College, Corvallis.

Pennsylvania: M. S. McDowell, Pennsylvania State College, State College.

Rhode Island: George E. Adams, Rhode Island State College, Kingston.

South Carolina: D. W. Watkins, Clemson Agricultural College of South Carolina, Clemson.

South Dakota: A. M. Eberle, South Dakota State College of Agriculture and Mechanic Arts, Brookings.

Tennessee: C. A. Keffer, College of Agriculture, University of Tennessee, Knoxville.

Texas: H. H. Williamson, Agricultural and Mechanical College of Texas, College Station.

Utah: William Peterson, Utah State Agricultural College, Logan.

Vermont: J. E. Carrigan, College of Agriculture, University of Vermont, Burlington.

Virginia: J. R. Hutcheson, Virginia Polytechnic Institute, Blacksburg.

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West Virginia: F. D. Fromme, College of Agriculture, West Virginia University, Morgantown.

Wisconsin: K. L. Hatch, associate director, College of Agriculture, University of Wisconsin, Madison.

Wyoming: A. E. Bowman, College of Agriculture, University of Wyoming, Laramie.

Alaska: R. L. Sheely, University of Alaska, College.

Hawaii: F. G. Krauss, University of Hawaii, Honolulu.

Puerto Rico: M. F. Barrus, University of Puerto Rico, Rio Piedras.

² Revised to Aug. 1, 1935.

REPORT OF THE CHIEF OF THE FOOD AND DRUG ADMINISTRATION, 1934

UNITED STATES DEPARTMENT OF AGRICULTURE,
FOOD AND DRUG ADMINISTRATION,
Washington, D.C., August 29, 1934.

SIR: I submit herewith the report of the Food and Drug Administration for the fiscal year ended June 30, 1934.

W. G. CAMPBELL, *Chief.*

HON. HENRY A. WALLACE,
Secretary of Agriculture.

INTRODUCTION

Food and drug work is naturally the dominant activity of this organization and will be the principal topic of this report. So far as can be done in limited space, the report will show the effectiveness of regulatory activities under the Federal Food and Drugs Act in comparison with the results of preceding years. Operations under the other five statutes enforced by the Food and Drug Administration and the restricted amount of authorized cooperative work for other governmental agencies will be covered only briefly.

Earlier reports have recognized an increasing public interest in questions involving the purity of the food and drug supply. At no time since the present law was enacted in 1906 has this interest been manifested so positively as during the past year. It has undoubtedly been stimulated by pending legislation intended to supplant the present Food and Drugs Act by a more far-reaching and more effective measure, and in part by the widespread publication of material purporting to describe unsatisfactory conditions existing in the food markets.

Some bad conditions unquestionably exist. Many cannot be corrected because of lack of jurisdiction under the present law. Others are neglected because the available personnel must be assigned to more pressing and important problems. Still others cannot be attacked until accurate methods of analysis can be developed in the Administration's research laboratories.

Regulatory work of the kind involved in the enforcement of the Food and Drugs Act is never completed. New types of adulteration and misbranding appear with changing commercial conditions, flourish for a time until regulatory methods can be devised to cope with them, and then are supplanted by still newer forms of infraction. During the past year, as in the two previous years, the problems of the Food and Drug Administration have been increased by the development or growth of abuses prompted by the prolongation of the business depression. Illegal commercial practices heretofore nonexistent have sprung up and others thought to be under control have been renewed. Revolutionary changes in transportation systems, and the employment of motor trucks for deliveries, have increased the difficulties of interstate law enforcement and as a climax the repeal of prohibition has resulted in the reappearance in legitimate commerce of the huge traffic in alcoholic liquors previously subject to the jurisdiction of another statute.

THE FOOD AND DRUGS ACT

CLASSES OF VIOLATIONS AND TIME ALLOTMENTS

The appropriation for the enforcement of the Food and Drugs Act for the fiscal year was \$1,185,000. Operations must be planned and directed with precision to guarantee a maximum of public protection with the available resources.

The most important activity under the Food and Drugs Act is obviously the suppression of practices that are public-health menaces, such as the shipment of foods containing added poisons or contaminated with disease-producing bacteria, and of worthless medicines offered for serious disease conditions. This phase of the food and drug traffic is invariably given first attention. If necessity arose, attention would be diverted to it from every other type of violation. Second in importance, are violations involving the distribution of decomposed or filthy foods. Such products are not necessarily harmful but they are wholly revolting. The framers of the Food and Drugs Act, in holding a product to be adulterated if it consisted in whole or in part of a filthy, decomposed, or putrid animal or vegetable substance, properly considered such products as unfit for food purposes. Finally, consideration must be given to types of violation which involve economic cheats. Although from the standpoint of the consumer's pocketbook these may be serious, their regulation can be undertaken only after the first two types of offenses have been controlled.

This regulatory policy, as has been pointed out in a previous report, presupposes the neglect of less important violations. For lack of facilities, the Food and Drug Administration must deliberately refrain each year from attacking some definitely recognized violations because of the pressing demands from the consumer standpoint, for action against more serious offenses. This neglect inevitably occasions criticism. Years of enforcement experience under restricted budgets have demonstrated, however, that this plan best serves the public interest.

During the fiscal year approximately 86 percent of the time available for enforcing the Food and Drugs Act was devoted to the regulation of interstate traffic in food and drugs and 14 percent to imports. Twenty-six percent of the working time was devoted to drug products, including crude drugs, pharmaceuticals, proprietary preparations, and veterinary products. Twenty percent was directed to work on fruits and 12 percent to that on vegetables. Most of this total of 32 percent was devoted to the spray-residue project. Eight percent of the time was spent on fisheries products, largely on types of violation involving filth and decomposition, and 9 percent on dairy products. The residual time, amounting to 25 percent, was devoted to the enormous traffic in other types of food products, including beverages (alcoholic and non-alcoholic), cereals, confectionery, coffee and tea, eggs, flavoring substances, and spices, oils and fats, nuts and nut products, saccharine products, mineral waters, meat products, and stock feeds.

PLAN OF INSPECTION AND SAMPLING

Random and undirected sampling and analysis of foods and drugs is costly and inefficient. Official samples from interstate shipments must be large enough to be representative and must be accompanied by shipping records sufficient to establish conclusively in court actions that they have been shipped within the jurisdiction of the law. Such official samples are seldom collected without reasonable ground for suspecting a violation. Preliminary information designed to establish the existence of an infraction is obtained by comprehensive factory inspection, by the collection and analysis of small investigational samples on which interstate records are unavailable, and less frequently through trade and consumer complaints. If preliminary inspection or sampling confirms the suspicion of violation, representative official interstate samples are collected. In the case of importations it is not possible to inspect all consignments with the force available. Years of experience have demonstrated that some commodities are peculiarly susceptible to adulteration and misbranding. First attention is given to such importations. In many instances visual inspection by an experienced examiner is sufficient to establish the character of the product. When doubt exists this inspection is supplemented by careful chemical, microscopical, or bacteriological examination.

STATISTICAL

Food and drug samples examined during the year amounted to 53,885. Of these, 29,013 were imported products of which 23,278 were foods and 5,735 drugs. Investigational samples examined as guides for the direction of subsequent regulatory work amounted to 8,818. The remaining 16,054 samples were selected official samples representing interstate shipments; foods accounted for 11,319 of the official samples, and drugs for 4,735. The official food samples

represented the output of approximately 4,267 domestic manufacturers of whom 1,545 were responsible for some degree of violation. The drug samples were the products of 1,289 manufacturers, of whom 933 were responsible for violations.

Table 1 presents a condensed summary of the actions taken under the interstate provisions of the law.

TABLE 1.—*Summary of samples on which recommendations for prosecutions and seizures were made under the Food and Drugs Act, fiscal year ended June 30, 1934*

Item	Prosecution	Seizure	Total
Food.....	665	1,264	1,929
Drugs.....	362	440	802
Stock feeds.....	71	25	96
Total.....	1,098	1,729	2,827

The comparable import statistics are shown in table 2.

TABLE 2.—*Import actions at port laboratories during fiscal year ended June 30, 1934*

Item	Inspected and refused entry	Inspected and released	Total
Foods.....	3,197	20,081	23,278
Drugs.....	1,026	4,709	5,735
Total.....	4,223	24,790	29,013

SCOPE OF NOTICES OF JUDGMENT

Between July 1, 1933, and June 30, 1934, there were published 825 notices of judgment recording cases terminated under the Food and Drugs Act. In addition approximately 1,075 were practically ready for printing on June 30, 1934, earlier printing having been prevented because of the limited departmental printing fund. These notices of judgment are not issued at specified intervals but are published in groups as rapidly as compilation can be made after termination of the cases in court. They constitute the published information authorized by the Food and Drugs Act concerning completed court actions. It is natural to anticipate that the total number of notices of judgment issued in any one year will correspond with the total shown at the bottom of the last column of table 1. That these figures never agree may suggest that the statistics are inaccurate. That this and other incorrect conclusions are drawn from the published statistics has been shown by critical inquiries addressed to the Administration.

One explanation of the discrepancy is that table 1 does not cover the same period covered by the notices of judgment. Further clarification is necessary, however. The individual notices of judgment are in the majority of cases limited to two kinds: Those captioned, for example, "U.S. v. 100 Cases Canned Fish," and those described as "U.S. v. John Doe Co." The former relate to actions brought against the offending goods themselves under the seizure provisions of the act, although in each case the name of the shipper is given. Seizures are instituted to protect the consumer by prompt removal of offending goods from the market. The other form of notice relates to actions brought under the criminal section of the law against the person or firm responsible for the shipment of food or drugs found upon examination to be in violation of the act.

Because a notice of judgment against a product makes no mention of criminal action against the shipper it does not follow that criminal action has not been instituted. The two types of action represent separate proceedings although they may be based on the same consignment. It is impossible, for

several reasons, to combine the two actions in one notice. (1) Judicial procedure requires that they be brought in separate jurisdictions. Seizure occurs where the consignment is found; criminal prosecution in the jurisdiction where the defendant has his place of business. (2) The criminal action is necessarily of slower development because the law requires the Department to accord a hearing to the responsible party, after which proper pleadings must be drawn up, affidavits of analyst and inspector witnesses secured, and all forwarded, through the Department of Justice, to the United States attorney in whose jurisdiction the shipper has his business. The case must then await its turn on the court calendar.

Undue delay would result in publishing notices on seizure actions if the outcome of the criminal prosecution were awaited. Whenever the facts warrant, seizures are followed by prosecution. The exacting character of the evidence required to establish in a criminal prosecution that an article was adulterated or misbranded when shipped, and that deterioration had not occurred subsequent to the shipment but before sampling at destination, precludes such prosecution in many cases where seizure action can be maintained. This accounts in part for the larger number of seizure actions recorded in notices of judgment. Also, it is the practice to consolidate a number of shipments by one firm, each of which may have been the subject of a seizure notice of judgment, into one prosecution action, in which each violative shipment appears in the pleadings as one or more counts against the defendant shipper. While this reduces the number of notices of judgment covering prosecutions it permits a more effective presentation to the court of the continuing character of the illegal practices of the defendant. Table 1, under prosecutions, shows, not the total number of criminal prosecutions terminated in the courts during the fiscal year, but the number of samples of foods, drugs, and stock feeds sampled, analyzed, and found violative, the records of which were referred in the course of the year to the Solicitor of the Department for use as a basis for counts in prosecutions brought against responsible shippers.

The fact that notices of judgment reporting seizures quite frequently state that after the issuance of a decree of condemnation the product was released under bond conditioned that it be not disposed of contrary to law, has occasioned repeated inquiry. This statement does not mean that goods are seized only to be returned to the owners with freedom to do as they please with them after paying nominal court costs. The law itself authorizes the court to release goods to claimants after condemnation, under specific conditions. Many cases arise wherein relabeling corrects a violation. In other cases only a portion of a seized consignment is in violation and sorting of the legal from the illegal is entirely practicable; failure to permit sorting would merely result in the destruction of wholesome food. The courts have ordinarily been unwilling to require such destruction. Following the provisions of the statute they have preferred to release the goods for proper sorting under bond. The expense of such operations is borne by the owner, and the relabeling or separation with destruction of unfit material takes place under the close scrutiny of inspectors of the Food and Drug Administration, thus insuring that no adulterated material returns to the channels of distribution.

FOOD ADULTERATIONS INVOLVING PUBLIC HEALTH

Surveillance of the fruit and vegetable traffic to guard against dangerous spray residues is still a major activity. The tolerance for arsenic has remained at 0.01 grain of arsenic trioxide per pound. A tolerance of 0.02 grain of lead per pound of fruit was in effect for the season of 1933 and has been reduced to 0.019 grain for the season of 1934. In the knowledge that certain growers were turning to fluorine sprays as substitutes for lead arsenate, a tolerance was set at 0.01 grain of fluorine per pound.

As was stated in the last report, it cannot be anticipated that spray-residue activities will slacken in the near future. Methods of combatting insect pests which do not depend upon the treatment of the growing crops with poisonous spray must be devised before the problem of spray-residue control can be fully solved. Conditions, so far as interstate traffic is concerned, are improving. Growers increasingly recognize that it is essential to follow the use of poisonous sprays with efficient cleansing processes before their products are marketed. The number of effective washing equipments installed in important producing areas has continued to increase. State authorities in many sections are working with the growers by analyzing representative samples from orchards and fields to determine whether objectionable quantities of spray residues are

present and to prescribe appropriate treatment to guarantee that only clean products will be shipped.

The total number of samples collected and analyzed either for lead, arsenic, or flourine, amounted to 6,098 from nearly 4,000 producers. The samples included 4,605 specimens of fruit and 1,493 of vegetables, and covered every type of produce which might possibly have been sprayed with poisonous chemicals. The total is made up both of investigational samples collected for information purposes to determine whether surveillance of possible interstate shipments should be maintained, as well as of official samples.

The following tabulation shows a total of 58 seizures based on excessive spray residues, as compared with 241 for the preceding 12 months:

<i>Seizures</i>	
Apples-----	34
Broccoli-----	1
Cauliflower-----	3
Celery-----	2
Currants-----	12
Crab apples-----	4
Cabbage-----	2

Since interstate shipments alone are subject to regulation under the Federal act, the public will never be entirely protected as long as poisonous sprays are applied until all State authorities exercise the same degree of effective surveillance that is now maintained in some States. Truckers who make purchases at random in producing sections and then haul the produce across State lines for sale at any convenient market, provide increasing complications in the problem of interstate control. It is obvious that no force which the Administration can muster can maintain a continuous and comprehensive surveillance over all truck traffic. At least one consuming State established its own border patrol and refused to permit importations within its boundaries of any truck shipment of fruit not accompanied by a certificate of analysis, showing freedom from excessive spray residue issued by competent officials of the producing State.

Apples continue to be the commodity requiring principal attention. Thirty-four seizures were effected, as compared with 137 the previous year. This improvement is attributed to the fact that the industry and State authorities in the apple-producing States of the Atlantic and Pacific coasts and of the Rocky Mountain area have quite generally come to recognize their obligations and have set up effective and comprehensive methods of spray-residue control. The same cannot be said of the apple-producing areas in the Great Lakes region and Mississippi Basin. While there has been some recognition on the part of growers of the legal necessity of producing residue-free fruit and of the more general installation of washing machines, there has been comparatively little control activity on the part of State authorities. An enormous truck traffic has developed, necessitating extensive patrolling operations by representatives of the Food and Drug Administration on the principal highways, for the purpose of sampling truck cargoes and directing action at destination where high residue fruit was found. Intensive surveillance in this area must be continued indefinitely.

In the vegetable field, cauliflower again received attention because during the last fiscal year shipments from Colorado and Long Island, N.Y., were found to contain excessive residues warranting numerous seizures. That the 54 seizures of last year produced a substantial corrective effect is shown by the facts that only 3 consignments of cauliflower were seized this year and that none of these originated in Colorado or Long Island.

Celery is another commodity that has heretofore required extensive regulatory action because of spray residue. Eighteen lots were libeled in 1933. Despite the usual extensive surveys, but 2 shipments were seized. Cabbage, on which 40 seizures were necessary in 1932, was likewise found in satisfactory condition, only 2 lots warranting seizure.

Attention was again given in the summer of 1933 to plants packing fresh crab meat. On the Atlantic seaboard bad sanitary conditions have been quite common in this industry, constituting a distinct health menace to consumers of the product. The survey of last year was repeated. While improvements have been made, some 56 plants or approximately half those in operation in that area still showed unsatisfactory conditions. A total of 61 seizures was made of consignments found to be definitely polluted as compared with 41 in 1932. The early returns from 1934 surveys, however, are more encouraging. The sanitary quality of the product now shipped is apparently better than in preceding years but this industry must be given continued attention.

While no food-poisoning cases have occurred during the year attributable to the consumption of food from interstate sources, it is not improbable that some tragic occurrences were narrowly prevented by prompt action in seizing consignments of spinach found to be infected with *Bacillus botulinus*. One of the principal producing States on the west coast maintains rigid cannery supervision, including the regulation of processing times and temperatures. In general, this surveillance has been capable and effective. In April, however, a commercial laboratory discovered that certain large-sized (no. 10) cans of spinach packed by a canner in that State were definitely contaminated with *B. botulinus*. The packer had operated under the strict regulations of the State board of health and the only plausible explanations for the conditions encountered are the possible occurrence of a more heat-resistant strain of the organism or some undiscovered error in the process of canning. Prompt joint action was taken by the packer, by the State authorities, and by the Food and Drug Administration in cooperation with various other States. The suspicious goods were identifiable by code numbers and were apprehended. This action quite probably prevented outbreaks of botulism.

Another product of small commercial importance but presenting a serious public-health menace was given attention. One firm conceived the idea of bottling without heat sterilization or pasteurization a number of products, including apple, orange, lemon, grape, and vegetable juices, among which were extracts of celery, spinach, and parsley. The manufacturer merely placed the filled containers in the sunlight for a certain period on the theory that the rays of the sun would preserve the products. Such a process is inadequate and the vegetable products, though of limited distribution, were potentially dangerous. Only small interstate shipments were made. One lot which upon examination showed decomposition, was seized at Boston while State officials condemned other small lots. In addition, the authorities in the producing State closed the manufacturer's establishment and required destruction of the residual stock.

As is invariably the case, reports were submitted this year of a number of alleged food-poisoning cases. Eighteen attributed to foods from interstate sources were carefully investigated. The most extended bacteriological examination of representative samples failed to reveal any organisms capable of causing illness in man. In all of these 18 cases the symptoms were those of gastro-enteritis and none resulted fatally.

One result of the repeal of prohibition which has an important child-health aspect was the sudden appearance on the market during the fall of 1933 of chocolate confections filled with alcoholic cordials and other liquors containing from 5 to 20 percent of alcohol. The Food and Drugs Act specifically defines a confection as adulterated if it contains, among other things, any vinous, malt, or spirituous liquor. This requirement was not affected by the repeal of the prohibition amendment. Chicago, Jersey City, and New York City were the three points from which distribution was made. In the East the traffic was carried on with the secretiveness of bootlegging operations. In the Central West the distributors were more open, apparently in the belief that the repeal of the prohibition amendment had nullified the prohibition against alcoholic candies. There was a wide distribution in the neighborhood of public schools. Newspapers gave considerable publicity to stories of intoxication among school children, resulting from the consumption of these candies. An immediate campaign resulted in 19 seizures. Criminal prosecutions are in course of development against the responsible manufacturers and distributors. In addition to the Federal seizures large quantities of the offending material were confiscated by local and State authorities. Traffic in alcoholic candies, for the time being at least, has entirely disappeared. This incident illustrates the recurring character of offenses under the Food and Drugs Act and the fact that a correction once secured by regulatory activity cannot be expected to remain permanent without the exercise of continual vigilance and the institution of new campaigns when circumstances warrant.

Another brief campaign of probable public-health significance was undertaken just before Easter and resulted in removal from the market of 16 consignments of Easter-egg dyes containing poisonous ingredients. The colors seized were essentially in the class of house paints, containing such toxic ingredients as cadmium sulphide, zinc sulphide, and barium sulphate with small percentages of lead as a contaminating impurity. Most egg dyes are harmless, and there is every reason to believe that these actions have put a stop to the distribution of poisonous products of this class.

FOOD ADULTERATIONS INVOLVING FILTH AND DECOMPOSITION

The product commercially known as "packing stock butter" is entitled to the dubious distinction of first mention in the list of food commodities against which repeated action has been taken on the ground of filth. The name "packing stock" butter is applied to the product usually collected in small quantities by country merchants from individual farmers and shipped at intervals to so-called licensed factories for conversion into ladled, process, and "adulterated" butter under the terms of the Internal Revenue Act of May 9, 1902. Some of this product is also shipped direct to manufacturers, particularly of cheap bakery goods and confections. There is no reason why packing stock butter properly handled and protected against contamination should not be a satisfactory article of commerce. It is often handled, however, with great carelessness. The farmer sometimes reserves his low-grade butter for sale for this purpose. It may be stored by the merchant without precaution against contamination until a sufficient quantity accumulates for shipment. It may thus become unspeakably filthy. The Food and Drug Administration has heretofore been handicapped by lack of reliable analytical methods for proving the filthy character of this material. It should be borne in mind that the Administration can proceed only on the basis of examination of samples taken from consignments after they have entered interstate commerce. While the unsanitary conditions surrounding the handling of packing stock butter are self-evident it has been difficult to prove objectively the filthy condition of the finished article. During the year a reliable and convincing analytical method was devised in the microanalytical laboratory. By its use the actual filth in the butter can be separated, estimated, and identified. The moment the method was perfected, an active campaign of seizure was instituted against packing stock butter, resulting in 107 seizures. The present condition still requires frequent legal action but there is a material improvement in the product now shipped.

The method for the detection of filth is equally applicable to creamery butter. Examinations of consignments of some of the lower grades of creamery butter showed evidence of filth in this commodity also, resulting in the seizure of 35 consignments.

These activities illustrate how dependent food officials are upon the laboratory to provide the instruments for legal correction. Analysts have long sought a satisfactory method for detecting evidences of filth in butter, and the comparatively simple procedure now in use is a recent development. The immediate effect of the seizure campaign thus made possible has been a tightening up on the part of the entire creamery and dairy industry and a manifestation of a purpose to obviate objectionable conditions at every point, from the source of production of the cream to the finished butter. Much progress has already been made.

Fisheries products always bulk large in the regulatory program. The attention given to crab meat has already been described. Surveillance of the traffic in whitefish and tullibees to prevent the distribution of fish infested with a parasitic worm has been continued. The situation as regards imported fish is fairly satisfactory. The principal importations occur in the territories of Minneapolis, Buffalo, and New York food and drug inspection stations. These stations examined a total of 676 lots aggregating 4,463,000 pounds, and detained 26 lots aggregating 101,800 pounds because of excessive parasitic infestation. Seizures of 20 lots of tullibees from domestic sources have been made and criminal prosecutions instituted in connection with 14 shipments. The parasitized-fish situation has improved, but continuous supervision will be necessary, particularly in view of the growing use of automobile trucks for transportation purposes.

Canned salmon was not so productive of court actions as in former years. While a very large pack was put up in the Bristol Bay area and special attention therefore given to the output of this district, very little questionable fish was encountered. The only seizure of bad salmon at San Francisco was a small lot proved to have been packed in 1925, which had suffered deterioration through age. In the Seattle territory, although some objectionable canned salmon was uncovered, the lots were generally smaller than in former years and the percentage of cans showing decomposed fish not so great. A total of 17 seizures was effected as contrasted with 107 consignments libeled during the previous year. Of 172 canneries either inspected or represented in the samples examined, 20, or 11.6 percent, were in some degree questionable as

compared with 25 percent in the 116 plants given attention in 1933. The record shows that nearly 1,000 official and informal samples were examined. Less than 11 percent of the official samples were found actionable as compared with 34 percent in 1933. Prosecution recommendations based on 153 samples were submitted to the Solicitor of the Department. These recommendations largely relate to the preceding season's pack.

Although the domestic canned tuna and sardine industries have in previous years required material regulatory attention, the close supervision now given by State authorities has resulted in marked improvement. Three seizure actions against domestic canned tuna, based on the packing of decomposed fish, were necessary during the year. In the case of canned sardines, five seizures involving the products of four packers were made. As a result, one of these packers recalled all other stocks of the objectionable code from the market for destruction before seizure action could be taken. In the case of one other packer, a contest ensued at Pittsburgh which resulted in a verdict for the Government. Fourteen other cannery products whose sardines were examined were found to be putting out legal products.

Importations of tuna, both canned and frozen, have occupied the time of the San Francisco and Los Angeles stations and material quantities of the canned article are imported through the ports of New York and Philadelphia. This product is largely of Japanese origin, with lesser quantities from Russia. The western laboratories examined 876 lots of the canned products aggregating nearly 6,500,000 pounds offered for importation. Detentions were made of 122 lots totaling more than half a million pounds because of the presence of decomposed fish. At Los Angeles there was offered for the use of American cannery about 6,130,000 pounds of frozen albacore, or white meat tuna, from Japan. Through the joint operations of the Food and Drug Administration and the State cannery inspection service, 830,000 pounds of this material found to be decomposed was destroyed. The New York and Philadelphia stations examined 489 lots of imported canned tuna aggregating 6,032,000 pounds and detained 13 lots or 93,000 pounds because of decomposition.

Canned shrimp continued to demand extensive attention. Four hundred eighty-three official samples, representing the output of 59 packers, were collected and examined. The output of 26 manufacturers was found in violation. Sixty-eight seizures were made. In spite of the continued attention given this industry for some years, fundamental correction of the causes of the unsatisfactory conditions has not yet been accomplished. The causes have been twofold; (1) the packing of shrimp which had been carelessly handled or kept so long that decomposition had set in; and (2) the use of inadequate processing temperatures so that spoilage occurred after the product had been canned. The outcome of the seizure campaign has been the adoption by Congress of an amendment to the Food and Drugs Act, approved June 22, 1934, designated as section 10A, authorizing the Secretary of Agriculture, upon application of any packer of any sea food sold in interstate commerce, to designate supervisory inspectors to examine and inspect all premises, equipment, methods, materials, containers, and labels used by such applicants in the production of such food. This service is to be given at the cost of the packer and acceptable products may bear appropriate inspection legends. Although the provisions of this amendment to the law are sufficiently broad to apply to all sea food, the legislation was undoubtedly the result of the experience of the shrimp-packing industry which reached the conclusion that in handling a highly perishable sea food the most effective method of insuring a satisfactory product suitable for human consumption is the application of a thorough-going governmental inspection and supervision at the source of production. Active steps have been undertaken by the Administration to install inspection in all shrimp-packing plants that apply for the service.

In last year's report it was stated that while fresh and dried eggs continued to be found in good condition, the character of the traffic in frozen eggs was far from satisfactory. A total of 12 seizures and 19 criminal prosecutions involving frozen-egg shipments was instituted in that year. In the present year, the good condition previously reported in the case of shell and dried eggs has continued and a noticeable improvement in the character of the frozen-egg traffic has been manifested. Sixty-nine manufacturers were given attention and 111 official samples collected, resulting in 5 seizure actions and 6 prosecution recommendations. Ninety lots of imported egg products comprising canned frozen eggs and dried eggs, many from China, were inspected. It was necessary to detain one lot aggregating 22,000 pounds of dried eggs because of decomposition.

A decided improvement in the quality of dried-egg products shipped from China to the United States was observed.

Cocoa-bean importations have for years required attention because of the presence of excessive amounts of wormy or moldy beans. In a product of tropical climates, shipped for thousands of miles by sea, a small amount of such defects is unavoidable. Rational methods of handling, however, will readily reduce the objectionable material. It has been the policy of the Administration to conduct a systematic campaign for the improvement of imported cocoa beans. Seven hundred and sixty-three lots, aggregating 224,095,000 pounds, were inspected during the fiscal year. Six million four thousand pounds were detained because of excessive moldy and wormy condition. This represents a detention of 2.7 percent contrasted with 2.6 percent the previous year, and nearly 7 percent in the 1927 season.

Dressed poultry and rabbits, which have required extensive attention in previous years, continued to show the same satisfactory condition reported in 1933. Eighty-one distributors of dressed poultry were given attention but no condition requiring action was uncovered. One seizure of decomposed rabbits was made.

Canned blueberries and canned cherries, which also in previous years have resulted in extensive seizures because of the use of wormy fruit, were in the main satisfactory. Seizure of the output of one New Jersey blueberry canner was effected. Again the close surveillance maintained over the blueberry-canning operations resulted in the diversion of wormy blueberries to the fresh berry market and necessitated 46 seizures.

Imported fruit products requiring special attention because of possible wormy or moldy conditions included dried figs, dates, and olives. Eight hundred and ninety-three lots of such products were examined, totaling 16,168,000 pounds. One hundred and seventy-six lots, comprising 1,309,000 pounds, were detained principally because of the presence of worms or mold. The olives were Spanish green olives heretofore reasonably free from worm infestation. The condition is something new in Spanish olive importations. As a result of the detentions, Spanish exporters have determined to make selective segregations for American shipments. Detentions of dates amounted to only one-fourth of the poundage detained last year, but the poundage of figs about equaled last year's detention, although less than those of several years ago. An enormous improvement in the character of imported figs has resulted from import supervision.

One thousand and thirty importations of nuts, amounting to 20,746,000 pounds, were inspected and 118 lots totaling 1,419,000 pounds detained. The cause of detention was invariably the presence of moldy or wormy nuts.

The report for the year 1932 referred to the detention of numerous importations of condimental seeds found to be in a filthy condition. This situation has not shown as much improvement as was to be expected. During the year, 1,745 lots, totaling more than 40,000,000 pounds of spices and spice seeds, were examined. Five hundred and twenty-three lots, totaling nearly 10,000,000 pounds, were detained. Detentions were practically equal to those made during the previous year. It is entirely possible for importers to clean spice seeds successfully and no reason is apparent why this material should not reach the American market in sound condition.

Dried fruit and dried-fruit products continue to be productive of violations. These articles are particularly subject to insect infestation. Seizures of such products, 73 in number, included apple butter, apple chops, dried apples, apple pomace, dried apple pulp, dried peaches, dried apricots, and dried pears. In some instances, in addition to the presence of insect infestation and filth, excessive spray residues were found. These products will be given continued attention.

FOOD VIOLATIONS INVOLVING CHEATS

Space will not permit a review of the many types of violations given attention under this heading. Activities on butter other than packing stock, and on a few other commodities will serve to illustrate the character of the work. The congressional standard for butter, established in 1923, requires that the fat content shall be not less than 80 percent, all tolerances having been allowed for. In the aggregate, if shortages in either weight or butterfat are permitted to continue an enormous tax will be imposed on the American consumer. As was the case last year, between 5 and 6 percent of the butter sampled was found to be in violation because of low fat or shortage in weight. Consignments are seldom encountered, however, showing the excessive short-

ages in butterfat or weight manifested in previous years. The record shows 124 shipments of butter, compared with 151 last year, seized because of short weight or low butterfat. Prosecutions were recommended against the shippers of 119 consignments. During the present year, substantial fines have been imposed in a number of cases against chronic offenders, and the courts in some jurisdictions have looked with favor upon the recommendation to confiscate seized goods and donate them to charitable uses, in the event the responsible shipper persists in shipping substandard goods into those jurisdictions.

A fraud that has occurred sporadically in the past and seems to have developed anew, is the sale of colored oleomargarine for butter. This revived traffic is carried on by undercover methods normal to bootlegging operations. When oleomargarine is substituted for butter the internal revenue laws as well as the Food and Drugs Act are violated. In consequence, investigations were made jointly with representatives of the Bureau of Internal Revenue. As a result there is every indication that this particular racket, for the time being, has been broken up. The responsible members of one gang centering in Hartford, Conn., have been indicted, convicted, and sentenced for conspiracy to violate the internal revenue laws.

Another investigation uncovered a ring operating from New York with a large number of outlets. Although the ring was apparently in operation only a few months before it was discovered and legal action initiated, it was evident, judging from the stocks of uncolored oleomargarine in storage, the perfection of the organization and its extensive ramifications, that it was preparing to flood the country with colored oleomargarine represented as butter. The finished product was so cleverly prepared in resemblance of butter that it was possible to sell it as such to some of the most experienced and largest butter distributors in the East. Several outlets and finishing plants were discovered in Boston as well as in other places. The responsible agents are now under indictment.

A growing amount of fraudulent traffic has been noted in the edible-oil industry. Literally hundreds of small operators in the East are engaged in marketing products under labels indicating them to be oils of foreign origin, usually olive oil, when actually they are mixtures consisting of a small percentage of olive oil with large percentages of cottonseed, peanut, or corn oil. These are just as wholesome as olive oil and can be legally sold if not misrepresented. Short measure is also prevalent. Products of 86 manufacturers were given attention during the year and, of these, 45 oil packers were found to be engaged in some form of violation. One hundred and sixty-nine interstate shipments were sampled. Seventy-four seizures were instituted and criminal prosecution based on 39 shipments recommended. Compared with 24 seizures and 19 prosecutions recommended last year, it is apparent that the condition has grown worse and will require continuous attention. The Administration is now receiving the cooperation of local and State officials in attacking this problem.

McNARY-MAPES AMENDMENT

In the absence of a specific appropriation for the enforcement of the amendment to the Food and Drugs Act of July 8, 1930, authorizing the establishment of standards of quality, condition, and/or fill of container for canned foods, the Administration allotted about \$12,000 from its food and drug appropriation to this project. Surveys were made of plants packing canned foods for which standards of quality and condition have been established. It was found that certain packers were mixing undercolored tomatoes, in some cases even completely green tomatoes, with fruit of very good color so that the entire pack met the color requirements of the standard. The standard for canned tomatoes was therefore changed so that color is judged according to the more poorly colored half of the contents of the can instead of on the basis of the whole.

Field and laboratory studies having shown that the insoluble solids are a reliable index of maturity of canned peas, the standard for peas was also changed so that peas with more than 22 percent of insoluble solids are substandard.

Seizure was recommended on 71 shipments of canned foods, products of 38 firms, totaling approximately 24,500 cases, including tomatoes, cherries, peas, pears, peaches, and apricots, which failed to meet the requirements of the amendment. Of these, 15 actions, totaling 12,700 cases, were directed against canned tomatoes, most of the violations being excess peel or poor

color. Thirty-three actions, totaling 6,200 cases, covered canned cherries, most of the violations being excessive pits. Nineteen actions, totaling 4,700 cases, concerned mostly overmature canned peas. The other 4 actions, totaling 900 cases, concerned the other fruits and were principally because of excessive trimming.

Litigation involving this amendment to the law will be discussed in a later paragraph.

ALCOHOLIC BEVERAGES, INCLUDING MEDICINAL WHISKIES

The appropriation for the enforcement of the Food and Drugs Act was made before the repeal of the prohibition amendment. The estimates on which the appropriation was based did not contemplate the regulation of traffic in alcoholic beverages. Upon the repeal of the prohibition amendment, however, these products became a legitimate article of interstate commerce, subject to the jurisdiction of the Food and Drugs Act. Importations and interstate shipments immediately assumed tremendous proportions and many violations of the act accompanied the revival of the industry. It was recognized that the Food and Drug Administration could not possibly supervise this entire traffic without neglecting all other lines of food and drug commodities. Principal attention was therefore restricted to products sold as medicinal whisky, but not of United States Pharmacopoeial purity; to imitations sold as genuine whisky; to products clearly short in volume; and to products mislabeled as to alcoholic content. The record shows the collection and analysis of approximately 400 samples from interstate shipments.

All whisky samples were tested for the ordinary denaturants and none found. Of the approximately 250 samples, representing 25 shippers of medicinal whisky, more than two-thirds failed to meet the requirements of the United States Pharmacopoeia and 29 seizure actions resulted. Following the initial seizures, manufacturers, almost without exception, relabeled outstanding stocks so as to bring them into compliance with the requirements of the act. In addition to the actions taken on medicinal whisky, 49 seizures were made of products incorrectly labeled as whisky or Scotch whisky. As examples may be cited articles composed of pomace and raisin brandy, and of colored molasses spirits branded as whisky; and alleged Scotch whisky consisting of a small percentage of Scotch whisky diluted with neutral spirits and colored with caramel. Additional grounds for seizure of products sold as whisky were short volume and false and fraudulent therapeutic claims.

It is self-evident that the present resources of the Food and Drug Administration are wholly insufficient to patrol the entire interstate and import liquor traffic and at the same time meet the other obligations in the way of protecting the purity of the food and drug supply imposed by the Federal statute.

ACTIONS ON DRUGS

Medicinal preparations alleged to bear false and fraudulent therapeutic claims formed the basis of 421 seizures, of which 50 were products sold as veterinary remedies. Two hundred and thirty-two consignments, including 28 veterinary preparations, were reported to the Solicitor for the institution of criminal prosecution. Preparations in this category against which action is now being directed are quite generally of rather limited interstate sale. This does not mean, however, that grossly misrepresented proprietary remedies are no longer to be found on the market. In the absence of a Federal statute applying the same standards of honesty and fair dealing to advertising that now apply to label declarations, manufacturers and distributors of proprietary remedies have an easy method of evading the penalties of the statute by selling their products under truthful labels and continuing their extravagant claims through the medium of advertising.

Anesthetic ether continued to receive routine attention. There are now only three manufacturers of this product in the United States. Representative samples from all are collected at frequent intervals. One hundred and thirty-two shipments were sampled during the year, comprising a total of 1,308 individual cans. Only seven cans were found to depart from the Pharmacopoeial requirements. Six of these were the output of one manufacturer. The consignments from which these specimens were taken were seized. The third manufacturer had an entirely clear record.

Exclusive of medicinal whiskies, 1,281 samples of official drug preparations were collected and analyzed. These included 1,121 samples representing 173 different United States Pharmacopoeia drugs and 160 specimens representing

62 different National Formulary articles. Slightly more than 1,000 samples of unofficial pharmaceutical chemicals and preparations were also collected.

In many instances the irregularities encountered in both official and unofficial drugs were of a comparatively minor kind in no wise affecting the therapeutic efficacy of the products. In some cases an entirely technical irregularity in labeling was involved. One hundred and thirty samples were made the basis of prosecution recommendation and 17 seizures were accomplished. Traffic in these commodities is usually too limited to permit of seizure action.

The last year or two has witnessed the development of a new type of medicinal humbug in the marketing of almost innumerable brands of so-called mineral crystals which are essentially laxatives or cathartics and owe their physiological properties to the presence of some well-known therapeutic agent, usually sodium sulphate. Medicinal claims of the most extravagant character are made for them. The more adroit manufacturers are careful to restrict such claims to radio and other advertising distributed separately from the interstate package. Where this precaution is taken, action under the Food and Drugs Act is impossible because of lack of jurisdiction. The attention given these products has, however, resulted in 30 seizures directed against 14 products.

The investigation of the bacteriological sterility of ampul solutions for hypodermic injection, started during the previous fiscal year, was continued. A total of 64 samples comprising 1,255 individual ampuls was examined. They included a variety of products ranging from distilled water and physiological salt solution to complex glandular extracts. No evidence of insterility was revealed in any of these samples.

In a somewhat related field bacteriological work was conducted to ascertain whether or not surgical catgut sutures on the market were free from viable bacteria. Examinations were made of 48 samples totaling 960 sutures. These examinations disclosed no basis for any action under the Food and Drugs Act.

Thirty-four biological vitamin assays were conducted on 17 products between July 1933 and July 1934. These assays for vitamins A, B, C, and D provided evidence on the basis of which legal action has been instituted in 9 cases. Progress in the handling of such products is necessarily slow because of the time-consuming character of available assay methods.

Three hundred and five biological assays of drugs and drug preparations were made during the fiscal year. The examinations are summarized in table 3.

TABLE 3.—*Biological assays of imported crude drugs, fiscal year 1934*

Article	Samples examined	Samples requiring detention and exportation
Aconite.....	5	1
Digitalis.....	40	1
Ergot.....	71	8
Strophanthus.....	6	4
Total.....	122	14

¹ Not official variety of aconite root.

TABLE 4.—*Biological assays of domestic drug preparations, fiscal year 1934*

Article	Samples examined	Samples requiring action
Aconite.....	22	4
Digitalis.....	57	4
Epinephrine.....	12	0
Ergot.....	47	1
Posterior pituitary extract.....	35	2
Squill.....	10	6
Total.....	183	21

¹ Legal action on basis of unwarranted therapeutic claims.

The Food and Drug Administration has quite recently issued a public warning against the use of dangerous drugs for reducing purposes, making particular reference to dinitrophenol and related compounds. Clinical experiments with this chemical have shown that it produces a marked increase in the metabolic rate, resulting in a destruction of the tissues, including fat. Medical authorities have warned against its serious dangers. Nevertheless the product has appeared on the market as a fat reducer for use without special precaution or supervision. Notwithstanding the dangerous character of this drug and similar products, and the unwisdom, from the public health standpoint, of permitting its unrestricted distribution, the Food and Drugs Act confers no authority to proceed against this product. This again illustrates the importance of amendatory legislation giving sufficient authority to the Federal Government to control dangerous reducing agents, cosmetics, and drugs.

ANALYTICAL METHODS

Investigation of the types and rates of decomposition occurring in canned shrimp and of methods for the detection of such decomposition was continued. Experimental packs of shrimp were prepared under controlled conditions, both the raw material and the canned product being subjected to chemical and bacteriological analyses. The results confirmed the bases of judgment followed by the Administration in the examination of canned shrimp and provided new data for use in the continued control of interstate shipments of this product.

During the year a study has been conducted to ascertain the prevalence and significance of certain bacteria on shelled nut meats. This study is being continued to determine whether or not there is any correlation between the presence of bacteria of the colon group on shelled nut meats and the sanitary conditions under which such products are prepared for the market.

The discovery that certain commercial processes for removing spray residue from fruit were leaving a disproportionate amount of lead, compelled an intensive study of rapid, accurate methods for lead determination to replace the cumbersome or inaccurate existing procedures. Six satisfactory methods were developed and made available to the industry. While the earliest method required 3 days for completion, the latest required but half an hour. While the latter belongs to the class known as "sorting" methods, it should prove of immense value to the industry in quickly determining whether the poisonous material has been reduced to a safe point.

Methods of precision for the commonly occurring organic acids in fruits and vegetables being now available, studies on the kinds and amounts of the characteristic organic acids of a wide variety of fruits and vegetables were completed. The results have been prepared for publication. They will be useful to regulatory chemists in evaluating the fruit and vegetable content of manufactured foods and in detecting the addition of organic acidulents.

The exploitation of "milk bread" and other baked products purporting to contain milk or butter, has made necessary the development of an analytical process for estimating the butterfat content of such foods. While methods previously developed by us gave a reasonably close estimate of the nonfatty milk constituents, it was essential to know whether skim milk or whole milk had been used. A method has been evolved which isolates practically 100 percent of all the fatty substances of bakers' products and then estimates the percentage of butterfat in the total fat by a modification of the well-known Reichert-Meissl number technic. Checked against authentic products containing known amounts of milk, the method has given satisfaction.

A large number of authentic samples of bleached and unbleached flour were collected in the various milling centers for the purpose of evaluating and improving existing methods for detecting, and determining the approximate amounts of the various bleaching agents in use (benzoyl peroxide, chlorine, and chlorine compounds, oxides of nitrogen). Methods for determining chlorine were modified and improved, and a rapid procedure for detecting benzoyl peroxide was developed. Methods for measuring the color, both of bleached and unbleached flour, were improved, and a method of color measurement more fundamental in character is now under study.

CERTIFICATION OF COAL-TAR COLORS

One thousand three hundred and thirty-eight batches of food colors, representing the output of 37 firms, were given routine examination to determine their compliance with the requirements of the food law. Straight dyes, not including repacked colors, amounted to 290,278 pounds. Twenty-one thousand one hundred and sixteen pounds of repacked straight dyes and 354,129 pounds of mixtures also were certified. It is interesting to note that the output of food colors, following a marked falling off in 1932-33, has returned to the production level of 1926 to 1931. During the year, 13 batches of straight dyes and 6 each of repacked straight dyes and mixtures were denied certification.

IMPORTANT COURT CASES

Numerous actions were concluded in the courts. Only three need be mentioned in this report. On March 5, 1934, the F. E. Rollins Co. of Boston, manufacturers of a product known as "B. & M.", an alleged external remedy for tuberculosis and other serious diseases, plead guilty in Boston to a violation of the Food and Drugs Act in the distribution of numerous shipments of this article. A fine of \$100 on each of 20 counts was imposed by the court, a total of \$2,000. Details regarding the contested seizure action involving this product, which preceded the institution of criminal action, were given in the annual report for 1932.

The report for 1933 records the beginning of an action in which an Indiana canner sought to restrain the Government by injunction from applying the terms of the amendment of July 8, 1930 (McNary-Mapes), to the product commonly known as "soaked dry peas." An injunction was granted by the United States District Court in Indiana. On March 14, 1934, the Circuit Court of Appeals for the Seventh Circuit sustained the lower court. At the time this report is written, legal and administrative consideration is being given to the steps now to be taken by the Department. The question at issue is whether further judicial review should be sought or whether the decision of the appellate court should be accepted and the product known as "soaked peas" exempted from the substandard labeling requirements set up by the Secretary of Agriculture for this article, under the McNary-Mapes amendment.

A decision of economic significance was rendered by the United States Court of Customs and Patent Appeals, on April 16, 1934. Soon after the Department of Agriculture began its intensive attacks upon excessively sprayed fruits moving in interstate commerce it became evident that some effective method of cleansing sprayed fruit to remove poisonous residues before shipment was essential. A chemist of the Philadelphia Food and Drug Inspection Station had devised and applied a process for the removal of residual poisonous sprays adhering to fruits, by the use of chemical solvents. To place this process in the hands of the fruit producers of the United States without royalty costs, a public service patent upon the process was sought. The validity of the patent claim was contested by a commercial concern which claimed prior invention. The issuance of a patent has been pending since 1927 while the question of priority has been considered by various reviewing bodies. The examiner of interferences of the Patent Office awarded priority to the chemist of the Food and Drug Administration and this decision was affirmed by the board of appeals. Thereupon the appellants carried the case to the Court of Customs and Patent Appeals, which affirmed the decision of the Patent Office, thus bringing to a termination patent litigation which has been in progress for approximately 7 years and finally making available to the American fruit grower, without condition, the process devised by the Government's chemist. The patent, 1967176, was issued July 17, 1934, covering the removal of residual poisons from fruits and vegetables and it was assigned to the Government and people of the United States.

THE FIGHT FOR NEW FOOD AND DRUG LEGISLATION

Almost from the date of passage of the present law, it has been apparent that in spite of its manifold virtues which have produced a material improvement in the character of the American food and drug supply, there are many defects which should be corrected and omissions which should be supplied if the American public is to be given the protection to which it is entitled. From the beginning, administrative officers entrusted with the enforcement of the Food and Drugs Act have repeatedly and urgently recommended the

passage of amendatory legislation. Record of such appeals will be found in reports of the Bureau of Chemistry and of the Food and Drug Administration, in departmental communications addressed to appropriate committee chairmen in Congress, and in hearing before congressional committees.

A completely revised food and drug bill, drafted in the Department of Agriculture by direction of the Secretary and with the approval of the President, was introduced in the Senate by Royal S. Copeland of New York, in June 1933, and was designated as S. 1944. From that time until the adjournment of Congress in June 1934, food and drug legislation was under active consideration by the Senate Committee on Commerce. On December 7 and 8, 1933, a hearing was held on S. 1944 by a subcommittee of the Committee on Commerce. Following this hearing the subcommittee chairman, Senator Copeland, introduced a revised bill designated as S. 2000. On February 19, 1934 he introduced a further revision, S. 2800. The full Senate Committee on Commerce held hearings on S. 2800 from February 27 to March 3, 1934. On March 15 the committee made further modifications of the measure and reported it favorably to the Senate. Congress adjourned, however, without action on the bill.

The outstanding provisions of the proposed legislation were discussed in detail in the annual report for 1933 and the importance of the measure from the standpoint of public protection was fully described. The measure, in addition to preserving all of the many worthy features of the present statute, is designed to bring within the scope of the law cosmetics, mechanical devices intended for curative purposes or for affecting the structure of the body, and advertising of foods, drugs, and cosmetics. It prescribes more effective control in the case of dangerous drug products and food containing poisons or prepared under conditions constituting a health menace. More definitely informative labeling is provided for, and penalties of a more corrective character are established.

In spite of material public support, this measure, as was to be expected, aroused bitter opposition from certain trade elements, particularly the proprietary-medicine industry and sections of the advertising profession which saw in the passage of such legislation a curb on lucrative practices heretofore indulged in with impunity. A vast amount of misinformation to the effect that the bill if passed would result in destruction of legitimate industries, interfere with the right of self-medication, and deny manufacturers their constitutional rights, was disseminated not only among the industries but among the public. A flood of bills purporting to accomplish the same purposes was introduced with the undoubted result of effectively confusing the issue. While all of them extended somewhat the scope of the present statute, the restrictions of some on regulatory action would have effectually nullified many of the provisions of the present law now potent for public protection. Trade opposition, together with the congested congressional legislative program, was largely responsible for the failure of Congress to take action.

The fight for effective food and drug legislation is not ended. The months of effort already expended have not been wasted. Constructive suggestions have been developed in the course of the hearings which will undoubtedly improve the chances for the enactment of legislation at the next session of the Congress. Most important, however, is the aroused public interest in the purity of the food and drug supply, a concern which has long been dormant. This interest, once aroused, will unmistakably grow into a united demand for effective legislation which cannot be gainsaid.

INSECTICIDE ACT

The Insecticide Act is designed to protect the consumer against misbranded and adulterated insecticides, fungicides, and disinfectants. Some types of these products have become standardized through long usage and the application of control measures authorized by this act, but new preparations are constantly placed on the market and the use of old ones extended to new purposes. Since the spray-residue problem has become acute, many preparations intended to replace lead arsenate for use on fruits and vegetables have been put on the market. Each product, which is generally recommended for use against many varieties of insects, must be tested extensively in the field to determine its effectiveness and whether it will injure the vegetation.

Likewise, there are advances in the application of insecticides in the household and on animals; of fungicides, particularly those for use in the soil and

on seeds; and of disinfectants. Each of these advances entails careful study to determine the effectiveness of the proposed treatment and its limitations so that the consumer will be guarded.

During the year, 1,474 samples of insecticides, fungicides, and disinfectants marketed in this country were analyzed chemically, and where necessary subjected to microscopical, bactericidal, and field or greenhouse tests, as follows:

	<i>Number of samples</i>
Arsenate of calcium-----	61
Arsenate of lead, paste and powdered-----	79
Paris green-----	11
Bordeaux mixture and combinations of bordeaux with arsenicals-----	72
Lime-sulphur solution and sulphur preparations-----	152
Lubricating-oil emulsion sprays-----	42
Miscellaneous insecticide and fungicide preparations for agricultural use-----	173
Preparations for the treatment of mange-----	27
Sprays for house flies and for protection of animals against flies-----	28
Preparations for lice and fleas on animals (including poultry) and for chicken mites-----	102
Disinfectants, germicides, and bactericides-----	232
Sodium hypochlorite disinfectants, and related products-----	89
Preparations for the control of clothes moths-----	261
Preparations for other household insects-----	46
Miscellaneous and fraudulent preparations-----	99
Total-----	1,474

As a result of these analyses 115 cases were referred to the Office of the Solicitor for the institution of seizure proceedings or for criminal prosecution of the manufacturer. In addition, 358 samples were collected from consignments of insecticides and fungicides offered for importation, 26 of which were found to violate the provisions of the act and were denied entry or were released after correction of labeling.

CAUSTIC POISON ACT

The Caustic Poison Act applies to certain caustic or corrosive substances and preparations containing them and requires that containers of the substances suitable for household use shall bear conspicuous and easily legible labels conveying the common name of the caustic or corrosive substance, the name and place of business of the manufacturer, packer, seller, or distributor, the word "Poison" in letters of a specified size and style, and directions for treatment in case of accidental personal injury.

The requirements of the statute are quite generally met. During the year, 89 citations to hearings were issued. The majority of these were based on products labeled as poisons but failing to meet some of the specific statutory requirements such as style and size of type. Citation in most instances resulted in prompt correction. Eight criminal and seizure actions were instituted.

IMPORT MILK ACT

The general reduction in volume of foreign-produced milk and cream entering the United States was reflected in a smaller number of samples examined and fewer inspections undertaken of dairies and cattle under the Import Milk Act. This resulted in the withdrawal for assignment at other points of some of the personnel stationed previously on the Canadian border. Laboratory facilities are so maintained as to permit ready handling of increased work when future importations warrant it.

TEA ACT

Every shipment of tea offered for entry during the year at any port in the United States was sampled and examined, as provided for by the Tea Act. Teas that failed to meet the official standards of quality, purity, and fitness for consumption were denied entry.

During the year 85,777,162 pounds of tea were examined, and 142,146 pounds were rejected. The percentage of rejected tea is 0.166 and is considerably greater than last year, but is well within the range of variation of the past few years, as may be seen from table 4, which shows the quantities of tea examined and rejected, together with the percentage of rejections for the past 10 years.

TABLE 5.—*Tea examined and rejected,¹ 1925-34*

Year	Tea examined	Tea rejected		Year	Tea examined	Tea rejected	
		Pounds	Percent			Pounds	Percent
	<i>Pounds</i>				<i>Pounds</i>		
1925.....	92,925,470	84,137	0.090	1930.....	84,732,677	207,884	0.245
1926.....	98,551,814	457,537	.464	1931.....	87,091,330	49,253	.057
1927.....	97,595,579	100,708	.103	1932.....	90,587,055	90,321	.100
1928.....	91,105,613	57,121	.062	1933.....	95,818,033	38,159	.040
1929.....	93,593,264	115,084	.123	1934.....	85,777,102	142,146	.166

¹ The rejections are those made by the tea examiners, not the final rejections made by the United States Board of Tea Appeals.

NAVAL STORES ACT

Under the service provision of the Naval Stores Act, there were graded for producers in the South a total of 111,077 barrels of rosin, covered by 682 United States classification and grade certificates. The sums claimed by the Administration from those requesting these services amounted to a total of \$8,000.76, returned to the United States Treasury as miscellaneous receipts. Table 5 shows the volume of rosin-grading work for the past 10 years.

TABLE 6.—*Rosin-grading work, 1925-34*

Year	Rosin graded	Certificates issued	Miscellaneous receipts	Year	Rosin graded	Certificates issued	Miscellaneous receipts
	<i>Barrels</i>	<i>Number</i>	<i>Dollars</i>		<i>Barrels</i>	<i>Number</i>	<i>Dollars</i>
1925.....	9,942	82	1,281.81	1931.....	181,429	741	13,913.62
1926.....	5,725	51	631.64	1932.....	145,969	676	10,343.38
1927.....	105,742	293	7,543.66	1933.....	102,032	596	7,291.00
1928.....	174,559	441	12,369.69	1934.....	111,612	682	8,000.76
1929.....	172,604	497	11,836.29	Total.....	1,206,830	4,745	87,168.05
1930.....	197,216	686	13,956.20				

Surveys were made to determine whether turpentine and thinners were selling in conformity with the requirements of the Naval Stores Act. General compliance with the act was found.

Citations to hearings were issued in 3 cases, on 2 of which prosecution was recommended. One of them covered eight different lots of turpentine consisting of mixtures of gum spirits of turpentine and sulphate wood turpentine which were labeled and sold as pure gum spirits of turpentine.

One hundred and thirty-five lots of rosin, representing total shipment of approximately 35,000 barrels, were examined to determine the correctness of grading. Twenty lots were found misgraded and 6 citations were issued, 1 covering 8 lots, another 5, and a third, 3 lots. One case has been referred for prosecution.

A further study was made of the grading of rosin by means of so-called "charge" or "vat" samples, as compared with samples taken from the rosin after it has cooled and solidified.

The study of the color of rosin and rosin standards has been continued. Improvements have been devised in the spectrometric and photoelectric apparatus used in the fundamental study of the color of rosin and rosin standards, making greater accuracy possible.

COLLABORATION WITH OTHER BRANCHES OF THE SERVICE

The Food and Drug Administration is called upon each year to analyze samples of foods, drugs, and insecticides for other governmental agencies and to render technical opinions on the labeling of such products for these agencies.

In cooperative work with the Post Office Department medical briefs were prepared in 102 cases, and 326 analyses and tests were made of drugs, cosmetics,

and devices. The products involved were under consideration by the Post Office Department to determine whether or not their distribution was in violation of the postal fraud law.

At the request of the Federal Trade Commission, opinions were rendered upon the therapeutic value of approximately 100 drugs and devices.

There were examined 1,043 samples of foods, drugs, and insecticides, submitted by other establishments of the Government mainly to determine whether or not the products sold to the governmental establishments complied with the purchase specifications. The larger number of samples was submitted by the Veterans' Administration, the Treasury Department, the Marine Corps, and the Department of Justice, with lesser numbers from the Navy Department, the War Department, Federal Surplus Relief Corporation, Shipping Board, Soldiers' Home, and the Bureaus of Biological Survey, Chemistry and Soils, Dairy Industry, and Agricultural Economics.

REPORT OF THE FORESTER, 1934

UNITED STATES DEPARTMENT OF AGRICULTURE,
FOREST SERVICE,
Washington, D. C., September 1, 1934.

SIR: I transmit herewith the report of the Forest Service for the fiscal year ended June 30, 1934.

Respectfully,

F. A. SILCOX, *Forester.*

HON. HENRY A. WALLACE,
Secretary of Agriculture.

A HUGE WORK RESERVOIR

One-third the area of the continental United States is forest or potential forest land. Sound economics requires that this area be so managed that it may permanently support its fair share of the Nation's population. The fundamental purpose of public conservation policies is to solve this problem. To accomplish it, lands must be kept productive and forest resources managed as crops, on sustained-yield bases, rather than as mines. This is a long-time job; one that calls for national planning and involves the problem of privately owned lands. For nearly three-fourths of our forest land is in such ownership. These private lands have furnished 98 percent of our annual cut of forest products and, logged with no regard to the future, a great proportion of them will be in no condition to yield new timber crops for decades.

The task calls for rebuilding much of our forest empire; for improving and developing still more of it. This is both possible and feasible. And once this task is accomplished, forests can support many more people than they now do; forest capital will be secure rather than insecure; forest industries stable instead of unstable; permanence rather than enforced migrations may characterize the lives of families; whole communities can then depend upon a continuous supply of forest products.

In this rebuilding and improving lies an unparalleled opportunity. By means of such work, forest properties will become added sources of labor employment and of supplies; the doing of it will aid in the immediate national effort for relief; social and economic reconstruction and rehabilitation will be forwarded. From this huge work reservoir, old jobs may be replaced by new.

In this respect, past performances are indicative of future possibilities. During normal times, forest work gave full-time employment to approximately 1,500,000 people. The sale and distribution of forest products helped keep another half million or more in jobs. Two and a half million farmers secured sorely needed supplemental cash incomes, plus wood and building material, from forest lands. The predepression capital value of our forests and forest industries has been estimated at 10 billion dollars: gross annual income from forest-industry products averaged close to 2 billion dollars prior to 1929. And although they include only some 162 million acres of land, the Federally owned national forests furnished more than 26,000,000 man-days of work during a 12-month period in 1933-34.

This work is essentially an investment. Planned to help protect, develop, and perpetuate forest resources, it has made Federal forest properties more valuable. Facilities for fire protection have been bettered, timber stands

improved, recreational resources expanded, old burns replanted, and erosion checked. All these things are in the public interest. They work toward a coordinated development of forest resources and facilities, present and future. They contribute to the good of the entire Nation; constitute investments which may be relied upon to produce dividends with wide social as well as economic values.

Ever since the close of our pioneering period, forest industries have created local markets for farm products, provided full- or part-time work for farm populations, and helped lighten the burden of taxes. Forest recreation and wildlife have afforded sources of income. And the indirect values of forests in helping to prevent losses have been enormous.

It is recognized, for example, that the destruction of forest cover contributes to floods, erosion, and silting; that the presence of forest cover helps to retard run-off and control erosion and silting. Yet we still have more than 41,000,000 acres of privately owned forest land burned annually; more than 74,000,000 acres devastated or sparsely stocked with young growth; more than 380,000,000 acres on which private owners have failed to install such management as will keep the lands producing forests. In the face of such conditions we have continued to repair the results of national catastrophes with little regard to forest influences. Flood damage in a southern State once noted for its virgin forests has averaged close to a million dollars a year for 20 years; flood damage in a nearby State is about the same. The national bill for removing silt and other river and harbor work designed to aid or restore navigation has already exceeded 2 billion dollars. And there are, right now, some 2,000,000 acres of old burns on the national forests. They represent in large part man's carelessness with fire; reforested, they again become productive.

These facts illustrate some of the indirect values at stake. They point to national responsibilities. They indicate the kind and the extent of projects which offer opportunities for noncompetitive work in maintaining, restoring, improving, and perpetuating our forest resources and so providing permanence for family and community life. This can be done without glutting the market, for there are many uses in addition to industrial for growing forests.

In the past, little labor has been employed in work of this kind. Four-fifths of our remaining forest and potential forest land is, as has been said, in private ownership; and from that land has come 98 percent of our annual cut of forest products. The lumber industry was founded and financed on the basis of rapid liquidation. It supplies forest products by utilizing what nature, in its bounty, has provided. Its policy has been to remove timber rapidly; to cut out and get out without thought of the future of denuded lands; with no sense of responsibility for ghost towns in North or South, East or West; without regard to scattered, depressed agriculture and undermined economic and social structure. In this process one after another of the great timber regions have been tapped, then drained, like a succession of huge reservoirs. The last of those reservoirs is now the virgin forests of the far West. They still contain enough timber to last for many years. But the cream has been skimmed. In the meantime centers of population, with the bulk of the demand for forest products, are in the East and the Middle West; higher transportation costs are upon us; and prices of lumber and forest products continue to advance as logging operations are pushed into lower grade and more inaccessible forest stands.

In recent years labor and capital have increased production from agricultural lands. They have, at the same time, drained forest lands in private ownership to the point where rebuilding, improving, and developing them is essential to national welfare. There is also an urgent problem in protecting, improving, and developing the publicly owned national forests. They contain less than one-sixth of the total forest land in the continental United States. Yet carefully considered plans indicate the need for at least 20,000,000 man-days of work annually, for years to come, on these Federally managed properties. This is significant. For the need is far greater, proportionately, on forest lands now in private ownership. All forest lands unquestionably constitute a reservoir of noncompetitive work which can go far in helping to solve immediate problems of relief, reconstruction, and rehabilitation. Such work is, moreover, essential if one-third of our total land area is not to be handled on a suicidal basis; is, rather, ultimately to support its fair share of the Nation's population.

THE PROBLEM OF PRIVATE LANDS

Of all our forest and potential forest land, that now in private ownership is the most important. It constitutes the larger proportion of the total. It is the bulk of the most highly productive, the most accessible, the most easily logged forest land in the country. It is, too, that which has suffered most. For of the 83 million acres now devastated or poorly stocked, nine-tenths is privately owned; an appreciable part of the remainder reached this condition before coming into public ownership. And 98 percent of the forest area burned annually, during the last few years, has been in private ownership.

This ownership is, moreover, unstable. About 25 million acres of forest land, largely industrial, is now tax-delinquent in the Lake, southern, and Pacific coast regions. With the urge for rapid liquidation, most of it has passed out of production. To avoid carrying charges, it has passed from the tax rolls. This process has been hastened by the depression. Decades are required to grow forest crops. Continuity of policy requires long-time national planning. Stability of land ownership is, therefore, a prerequisite to adequate forest-land management. And unstable private ownership vitally limits the application of that management.

Recognizing this fact, the Forest Service recommended last year an acquisition program involving both Federal and State participation. It placed at 224 million acres the area desirable for acquisition by public agencies within a suggested period of 20 years. This is in addition to areas now so owned and managed. One purpose was to provide necessary stabilization. In that recommendation the Department concurred; to it, hearty support was given. As a result, the Federal policy of land acquisition for national forests has been speeded up. During the last fiscal year 4,206,560 acres of privately owned forest land were acquired or placed under contract of sale to the Government, as against 672,425 acres in the previous year and a maximum of 547,925 in any one earlier year. Accelerated progress is being continued in the current year. The net result of the immediate program will be the addition to the national forests, largely in the eastern, southern, and Lake States regions, of more than 7 million acres of forest, future forest, and watershed-protection lands. They will provide proportionately enlarged opportunities for employment, reconstruction, and rehabilitation; a sound basis for reestablishing permanent communities supported by stable forest industries.

LAND-USE PLANNING

The need for continuing this program at an adequate rate is obvious. Since its accomplishment depends partly on the willingness of the States to participate, an understanding with each State as to the character, amount, and location of the land for which public ownership is necessary or desirable, and as to how the task involved should be apportioned, is being sought. This and other information will be made available to the Department for the National Resources Board and the land policy section of the Division of Program Planning of the Agricultural Adjustment Administration. Through those agencies it may be correlated with data relating to land and water use throughout the country. This study will thus include the whole problem of forest-land use, and the private, State, and Federal forest-ownership program necessary to carry out a national land-use plan.

EMERGENCY WORK-RELIEF PROGRAMS

A requisite in forest upbuilding is protection. Without it, timber cannot be grown nor can other forest resources and services adequately be realized. Protection is, therefore, an investment; as essential for forest as for city property. City fire protection requires more than fire fighters. This is equally true of forest-fire protection. For it, there must be look-out towers from which fires may quickly be discovered; telephone lines over which reports may be flashed; roads and trails over which fire fighters may be transported. Men, plus things like these, constitute the forest-protection system. In the establishment of that system remarkable strides have been made possible through various emergency-relief allotments.

Because of the opportunities in noncompetitive forest work, there was entrusted to the Forest Service during the fiscal year 1934 the planning and

supervision of constructive projects which may roughly be divided into those on (1) national forests, (2) State forests and other State-owned or managed forest lands, (3) State and private forest lands as authorized by the Clarke-McNary Act of June 7, 1924, and (4) private lands on which erosion control work was empowered by the Emergency Conservation Work Act. On the national forests alone more than 26,000,000 man-days of work on planned projects was provided.

The immediate purpose of these activities was largely to relieve distress. They were, however, so planned and executed that they have greatly increased the potentialities of the properties to contribute to the support of the nation's population. Included in the projects were, for instance, (1) improvements of existing timber stands and thinnings and removals; (2) reestablishment of forest cover by the development of tree nurseries and by the planting of reforested areas; (3) diminution of forest destruction by control of insects and diseases; (4) reduction of excessive fire risks by removal of hazardous conditions, construction of forest highways, forest-development roads, protective motor ways, horse trails, look-out houses, telephone lines, firebreaks, and other facilities; (5) reduction or control of soil erosion as a means of flood control; and (6) creation of more favorable conditions for wild animals, birds, and fish.

Results were made possible through the Emergency Conservation Work, the Public Works, the Civil Works, and the Transient Relief programs. Of these, that of the Emergency Conservation Work is, perhaps, the most widely known. It included, during the fiscal year, such outstanding things as the first mass attack ever directed toward the effective control of the white pine blister rust disease; the first extensive direct undertaking in timber-stand improvement; a large increase in forest areas planted; effective work in the control of floods and soil erosion; very substantial progress in the detection, communication, and transportation systems for fire control on national and State forest properties; and progress in the development of forest recreational and forage resources. A detailed statement of E. C. W. undertakings and results is published in the reports of the Director of Emergency Conservation Work. The Forest Service planned and supervised 80 percent of all work projects handled under the E. C. W. program.

Experience in construction work and in recruiting and handling large fire-fighting forces has developed in the regular Forest Service organization the ability to expand quickly and effectively. Quick action in getting National Industrial Recovery Act programs under way in accordance with established standards for similar work was, therefore, possible. With funds provided from the Public Works program, approximately 2,525,000 man-days of employment had been provided by the end of the fiscal year. The maximum number of workers at any one time was 17,475, though this number has been materially increased during the current fiscal year. This does not take into account work which was made possible by an allocation of \$15,000,000 to the Bureau of Public Roads for the construction of forest highways.

Early in December 1933 the Civil Works Administration authorized the Forest Service to employ 31,500 workers on various kinds of national-forest improvement work and on forest and range research. Severe winter weather during the limited period of the Civil Works program prevented as effective handling of the work as was attained with Public Works funds. In many instances the men were undernourished. This necessitated instructions to foremen to favor such cases, pending ability for greater efforts. The Civil Works program did much toward the alleviation of suffering due to adverse economic conditions and provided support to many who otherwise would have been in extreme want. The total number of man-days of work provided was approximately 1,412,000.

The Transient Relief Bureau established work camps on the national forests. Crews, managed by employees of that Bureau, were in many cases quartered in camps not then being used by the Emergency Conservation Work. The large turn-over in enrollment and the emphasis placed on self-subsistence, low costs, and relief precluded as high accomplishments per man-day as from other classes of forest workers. Up to June 30, the work was on a very small scale. The numbers engaged fluctuated materially, with an estimated average in the neighborhood of 1,000 men. Subsequently to July 1, additional camps have been established.

THE LUMBER CODE

Under a National Recovery Act code, the lumber industry has committed itself "to conserve forest resources and bring about the sustained production thereof." Industry representatives, in conference with those from the Department and State and other agencies, have established principles to serve as a basis for conservation measures to be required in woods operations. Those principles have received formal approval by the President. Regional rules of minimum woods practice have been accepted by the National Industrial Recovery Agency. They became effective on June 1, 1934. Forest Service representatives have been appointed on Regional Code Authority bodies. The Forester has been named by the President as 1 of 3 nonvoting members of the Code Authority. Recognition is given to the need for audits by a qualified, technical, public agency. The Forest Service has set up its skeleton organization, which provides cooperative inspection of woods operations and technical advice in enforcement of woods-practice rules. In the public interest, as the work progresses this organization must be strengthened.

The purpose of these woods-practice rules, to which the lumber industry has agreed, is to leave forest lands producing. This is a minimum requirement. It is progress over past performances, to be sure. But the fundamental purpose of article X of the lumber code goes farther than this. It aims to assure for each economic unit a continuous supply of forest products; a continuous operation; stability rather than instability of employment; permanence rather than impermanence for communities dependent upon forests and forest products. This is known as sustained-yield forest management. It is essential that it be extended to commercial forests in private ownership. In recognition of that fact, the lumber code permits production control and establishes the principle and practice of cost protection. These two measures help to provide the basis for sustained yield and for forest products at the lowest legitimate possible cost to the consumer. In addition, Federal aid in fire protection is extended to private timberland owners under the Clarke-McNary Act of June 7, 1924; cooperation in research is extended by the Forest Service, and the going value of authorized emergency conservation work on private lands is conservatively estimated to have exceeded 83 million dollars for the period from April 5, 1933, to and including June 30, 1934.

RESEARCH

Research plays a vital part in all problems having to do with forest lands and their resources. In fact, never before have the demands for varied research in forestry been so great, never before has it been necessary to collect and analyze data so essential to success in a wide range of measures involving social planning and industrial recovery. These demands come from such activities as the conservation article of the lumber code, the emergency conservation work, Tennessee Valley Authority, drought relief, including the shelter-belt project, unemployment relief, Agricultural Adjustment Administration, marketing agreement with naval stores producers, the President's National Resources Board, the science advisory board of the National Research Council, and the Special Cabinet Committee on Rivers and Waterways. In all these, as well as in subsistence farming, submarginal land uses, and many other activities, forest research is deeply involved. The multiplicity and variety of these demands emphasize the need for fluid research funds available to meet special calls outside the regular research program. The regular program itself, vitally important, and needing to be prosecuted uninterruptedly, imposes demands far in excess of the resources provided for it.

THE FOREST SHELTER BELT

The drought of 1934 was unprecedented. The situation was most serious in the Plains area of the Middle West. Within much of this area natural tree growth is lacking; protection against sweeping winds is confined to shelter-belt groves established for the most part by individual ranchers. Isolated and relatively small, these groves offer inadequate protection to the Plains area as a whole. Widespread wind erosion is common. Topsoil is removed, and fertility of farms depleted or ruined. This attrition has been going on for decades. Attention was focussed on it during the current calendar year, when relief for the drought area became a public necessity.

With knowledge of past conditions, President Roosevelt looked to the future as well as the immediate present. Shortly after the close of the fiscal year he signed an Executive order authorizing large-scale shelter-belt planting. He wanted to see permanent, lasting benefits from this, a relief measure for the drought-stricken Middle West. The project represents a progressive experiment by man to ameliorate adverse natural conditions, the full result of which cannot yet definitely be stated. It involves exploration of facts, conditions, and possibilities; collection of technical, social, and economic information.

The shelter belt has been entrusted to the Forest Service. Organization necessary to handle the project in its present stage is on the job. Investigative work is in progress. Plans and methods are being developed for extending the work on such scale as the Congress may determine shall be employed. In the meantime obligations, definite or implied, will not be incurred beyond the \$1,000,000 now available.

ORGANIZATION

During the past year the regular force of the Forest Service has functioned under the stress of an enormous emergency work program. This has been superimposed on regular activities which are heavy in themselves. It has been necessary to expand supervisory, fiscal, and clerical forces many times. Hundreds of inexperienced workers have been trained. Regular personnel and established business methods have absorbed the overload, although the strain has been terrific.

Extension of national forest areas in the East made it advisable to establish, effective July 1, another regional office with headquarters at Atlanta, Ga. It has supervision over forests and related functions in the Southeastern States.

A TRIBUTE

My predecessor in office, Robert Young Stuart, met untimely death by accident on October 23, 1933, as he was entering upon the duties of the day. Except for 2 years of military service during the World War and a 7-year period in the service of the State of Pennsylvania as deputy commissioner and commissioner of forestry and as secretary of forests and waters, his entire life work had been with the Forest Service, which he entered in 1906. He had risen through successive promotions to high leadership; in his final position he guided the course of the Forest Service for nearly 5½ years. His sudden death removed from the public service an officer of outstanding ability and of the finest personal character. In this tribute the entire personnel of the Forest Service joins.

LEGISLATION OF THE YEAR

The acts making appropriations were:

The Agricultural Appropriations Act, fiscal year 1935 (48 Stat. 467), approved March 26, 1934.

The act of June 19, 1934 (48 Stat. 1057), carrying the emergency appropriations for 1935. It appropriated \$10,000,000 for forest roads authorized under section 23 of the Federal Highway Act, and also contained an appropriation for agricultural relief under which the "shelter-belt" work of the Forest Service is being done.

The following acts relating to national-forest administration were passed:

The act of June 18, 1934 (48 Stat. 993), authorizing appropriations to provide for emergency construction of highways and related purposes. Section 5 of this act authorized the appropriation of \$10,000,000 for the fiscal year 1936 and \$10,000,000 for the fiscal year 1937 to carry out the provisions of section 23 of the Federal Highway Act.

The act of June 26, 1934 (48 Stat. 1224), which did away with a number of continuing appropriations. This act does not affect continuing appropriations relating to receipts to States, nor the 10 percent of receipts granted the Forest Service for road improvements, nor cooperative funds.

The act of June 14, 1934 (48 Stat. 959), giving the Secretary of Agriculture authority to adjust claims to the so-called "Olmstead" lands in North Carolina, title to which was conveyed to the United States in settlement of a debt.

The act of May 11, 1934 (48 Stat. 773), which restricts the rights of mining claimants within the Mount Hood National Forest by retaining control of the surface of mining locations and claims.

The act of May 26, 1934 (48 Stat. 808), similarly affects lands within the Wasatch National Forest, from which the city of Salt Lake obtains its water supply.

The act of March 10, 1934 (48 Stat. 400), authorizing the establishment of game sanctuaries within national forests.

The act of June 14, 1934 (48 Stat. 955), amending the Weeks Act to permit up to January 1, 1935, under certain conditions, the Governor of a State which has not enacted legislation authorizing Federal land purchases for national forests to give this consent.

The act of June 14, 1934 (Private 244), authorizing payment to L. R. Smith for expense incurred in the construction of a road within the Blackfeet National Forest.

The act of June 28, 1934 (48 Stat. 1269), authorizing the Secretary of the Interior to regulate grazing on the public domain, although not directly relating to national-forest administration, also requires mention because of its importance in connection with all range administration of Federal lands.

On June 28, the President vetoed Senate bill 3741, to convey certain lands within the Harney National Forest to the State of South Dakota for park purposes, and Senate bill 3092, to confer jurisdiction on the Court of Claims to determine a claim of the heirs of James Taylor, a deceased Cherokee Indian, to lands within the Nantahala National Forest in North Carolina.

The following acts authorizing additions to national forests were passed:

The act of April 14, 1934 (48 Stat. 590), authorizing the President by proclamation to make additions to the Fremont National Forest, Ore.

The act of April 30, 1934 (48 Stat. 649), authorizing additions to the St. Joe National Forest and extending the Forest Exchange Act. This law will facilitate the establishment by the University of Idaho of a State University forest near Moscow.

The acts of May 3, 1934 (48 Stat. 657 and 658), adding lands to the Pike and Cochetopa National Forests, Colo.; and the acts of May 11, May 17, and May 21, 1934 (48 Stat. 772, 779, and 785), adding lands to the Ochoco National Forest, Ore., the Boise National Forest, Idaho, and the Mount Hood National Forest, Ore.

PROGRESS IN STATE FORESTRY LEGISLATION

At a special session of the Maine Legislature a law was passed authorizing Federal land acquisition for national-forest purposes by purchase or gift, but not by condemnation; Iowa passed a law authorizing Federal acquisition by purchase, gift, or condemnation; and in Missouri the maximum which might be acquired in any one county was increased from 25,000 to 100,000 acres, and provision was made regarding the distribution of money received from the sale of State lands to the Government.

Arkansas made the first appropriation for the continued operation and maintenance of the State forestry commission, created by the legislature of 1931, and initially supported by private subscription at the request of the Governor. Virginia revised the make-up of the State commission on conservation and development, effective January 1, 1935, when the present commission of 7 members will be replaced by one of 5, all to be newly appointed by the Governor, with a full-time salaried chairman to be designated by the Governor, and to receive \$6,000 a year.

New York appropriated \$5,000 to provide for the proper celebration in 1935 of the fiftieth anniversary of the establishment of the State forest preserve and the beginning of State conservation activities.

The Maine forest commissioner was designated by law a member of the recently created Baxter State Park Commission. A State planning commission was created by Maryland, with duties that include preparing plans for complete systems of State forest reservations and making surveys of rural-land utilization to determine the areas suitable for reforestation and recreation. Somewhat similarly, Mississippi created a commission consisting of the Governor, the State forester, and the director of the State game and fish commission, to survey all lands owned by the State and determine their adaptability for State forests, forest preserves, parks, or other purposes. The State forestry commission is to cooperate in making these surveys and is to have control and management of all forests and public parks created under this act, with payment of 75 percent of the gross revenue into the State treasury to the credit of the general fund. The South Carolina State Commission of Forestry was given control of all parks belonging to or that may be acquired by the State for general recreational purposes. West Virginia appropriated \$70,000 for the purchase by the conservation commission of lands for State parks.

South Dakota provided for the distribution of forest planting stock to establish windbreaks, shelter belts, forests, and farm wood lots, and to secure the planting of trees upon State, county, municipal, and private lands. The expenses involved are to be met from the State tree fund.

Oregon enacted a new forest fire law, commonly known as the "logging operator's permit law." During the statutory fire period or any extension thereof, on all lands west of the summit of the Cascade Mountains a permit to carry on a woods operation is required. The State forester may close operations whenever in his judgment weather conditions, slash hazards, or

both make operations hazardous; and punishment by fine, imprisonment, or both is provided for operating without a permit or during a closed period. Maine extended by a month the period during which the kindling of fires by nonresidents engaged in camping, fishing, or hunting is prohibited, making the period from May 1 to December 1. Washington provided for the formation, organization, and government of fire-prevention districts outside of incorporated cities and towns, in class A and first-class counties, with a tax of not more than 2 mills upon the assessed valuation of the property to meet the cost.

New York authorized the acquisition from the United States, by gift, lease or purchase, or otherwise, of lands suited for reforestation or other activities permitted by the conservation law, and amended the conservation law in many minor details relating to the assessment and taxation of lands acquired by the State for reforestation.

Arkansas created an "industrial and relief agency" empowered to aid forestation, relieve unemployment, and promote the public welfare by securing loans or grants of Federal moneys. Arkansas also provided for the formation of private limited dividend corporations to finance, through loans from Federal agencies or the sale of its securities, or both, and to carry out projects for the protection and development of forests under the supervision of the State forestry commission. Minnesota authorized the State executive council to extend direct relief and employment to the people of the State and undertake projects involving reforestation and afforestation or that will otherwise aid in the conservation and development of the natural resources of the State, with payment of the costs from State taxes on intoxicating liquor and beer in force and effect until July 1, 1935.

Illinois and New York enacted laws making provision for reimbursement of the Federal Government for the expense of emergency-conservation work if and when, by a sale of land or products, the State derives a profit from such work.

Oregon memorialized the President, directing attention to the effects of the devastating forest fires of 1933 in northwestern Oregon and urging that, in keeping with the spirit of article X of the lumber code and the practice of allocation of lumber production, the production quota for the recently burned area in Oregon be made, to the extent possible, from the entire quota to softwood production in the United States rather than from that of the region containing the fire-killed timber. The purpose sought was to make possible more extensive salvaging operations in this timber than would otherwise be permitted.

WORK OF THE YEAR IN STATE COOPERATION

Federal appropriations for cooperative work with the States during the year, as compared with those in 1933 and 1935, are shown in table 1.

TABLE 1.—*Appropriations for State cooperation, 1933-35*

Item	Amount appropriated for fiscal year—		
	1933	1934	1935
For the prevention and suppression of forest fires, and for the forest-taxation inquiry and the insurance study (secs. 1-3 of the Clarke-McNary law).....	¹ \$1,611,580	² \$1,565,635	³ \$1,573,619
For the distribution of forest planting stock to farmers (sec. 4 of the same law).....	79,960	⁴ 56,053	56,296
For farm-forestry extension (sec. 5 of the law, administered by the Office of Cooperative Extension Work).....	69,850	⁵ 50,240	51,354

¹ The item of the appropriation act was \$1,661,580. This was reduced by an administrative cut of \$50,000.

² The item of the appropriation act was \$1,587,513. The initial administrative cut was \$396,878, of which \$375,000 was later restored.

³ Made up as follows: \$1,348,619 from the Agricultural Appropriation Act of Mar. 26, 1934, and \$225,000 from the Deficiency Appropriation Act of June 19, 1934.

⁴ The item of the appropriation act was \$74,736. The administrative cut was \$18,683.

⁵ The item of the appropriation act was \$64,787. The administrative cut was \$14,547.

Table 2 shows in detail the Federal, State, and private funds disbursed by the States or expended under their supervision for the prevention and suppression of forest fires, and the Federal and State funds disbursed by the States for the production and distribution of trees for "windbreaks, shelter belts, and farm wood lots."

TABLE 2.—*Cooperative expenditures for fire protection and for the distribution of forest planting stock under the Clarke-McNary Act, fiscal year 1934*

State	For fire protection				For the distribution of forest planting stock		
	Federal	State	Private agencies	Total	Federal	State	Total
Alabama.....	\$33,000.00	\$11,220.34	\$24,085.91	\$68,306.25	\$863.18	\$863.19	\$1,726.37
Arkansas.....	18,000.00	3,978.21	20,810.65	42,788.86	56.00	56.01	112.01
California.....	171,711.00	144,274.07	228,958.49	544,943.56	1,026.29	3,126.53	4,152.82
Colorado.....	15,193.00	46,540.91	1,640.64	63,374.55	796.68	796.67	1,593.35
Connecticut.....	1,871.00	3,921.31	5,792.31	11,584.62	1,300.00	1,684.55	2,984.55
Delaware.....	67,760.00	24,549.65	43,210.35	135,520.00	1,500.00	4,940.25	6,440.25
Florida.....	41,700.00	13,120.03	28,593.06	83,413.09	1,288.33	1,288.36	2,576.69
Georgia.....	812.42	1,044.54	1,856.96	3,713.92	1,500.00	5,232.15	6,732.15
Hawaii.....	57,218.00	38,206.45	116,391.63	311,816.08	728.00	735.00	1,463.00
Idaho.....	7,126.78	7,126.82	14,253.60	28,507.20	1,500.00	2,667.28	4,167.28
Indiana.....	1,500.00	1,500.00	3,000.00	6,000.00	1,500.00	3,076.50	4,576.50
Iowa.....	829.00	1,379.00	2,208.00	4,416.00	1,500.00	3,637.88	5,137.88
Kansas.....	5,300.00	6,406.97	11,706.97	23,413.94	1,500.00	1,784.84	3,284.84
Kentucky.....	47,577.00	48,166.65	22,907.71	118,651.36	1,500.00	554.95	2,054.95
Louisiana.....	49,926.00	136,849.07	186,775.07	473,550.14	554.95	4,898.59	5,453.54
Maine.....	13,737.00	25,719.06	190.17	39,646.23	910.00	7,143.69	8,053.69
Maryland.....	27,925.00	65,329.41	93,254.41	186,508.82	1,500.00	6,222.37	7,722.37
Massachusetts.....	107,440.00	499,209.19	606,649.19	1,213,298.38	1,500.00	590.40	2,090.40
Michigan.....	20,716.31	14,027.29	6,752.64	41,496.24	482.00	1,692.54	2,174.54
Minnesota.....	94,896.00	362,306.65	457,202.65	814,405.30	2,500.00	11,320.00	13,820.00
Mississippi.....	24,601.00	12,735.44	50,283.27	87,619.71	1,363.64	3,056.18	4,419.82
Montana.....	1,904.00	211.00	4,578.93	6,693.93	2,500.00	3,170.01	5,670.01
Nebraska.....	15,596.00	31,712.53	4,948.99	52,257.52	1,500.00	12,609.29	14,109.29
Nevada.....	32,000.00	90,304.50	122,304.50	244,609.00	1,500.00	3,759.44	5,259.44
New Hampshire.....	1,955.50	2,762.00	3,200.00	7,917.50	1,094.02	1,094.03	2,188.05
New Jersey.....	82,706.99	237,730.87	320,437.86	640,874.72	1,500.00	8,120.82	9,620.82
New Mexico.....	38,000.00	31,515.27	8,372.75	77,888.02	1,500.00	7,034.41	8,534.41
New York.....	5,643.00	9,996.00	15,639.00	31,278.00	1,500.00	1,843.47	3,343.47
North Carolina.....	10,410.13	10,410.18	20,820.31	41,640.62	1,500.00	1,622.69	3,082.69
North Dakota.....	82,655.00	134,726.70	140,320.00	357,701.70	1,500.00	9,299.75	10,799.75
Ohio.....	76,671.00	231,133.31	307,804.31	515,608.62	1,500.00	5,271.50	6,771.50
Oklahoma.....	1,912.00	10,808.24	12,720.24	25,440.48	1,500.00	2,502.84	4,002.84
Oregon.....	21,604.67	9,144.49	12,689.02	43,438.18	500.00	1,998.23	2,498.23
Pennsylvania.....	791.00	2,175.55	2,966.55	5,933.10	1,500.00	2,242.97	3,742.97
Puerto Rico.....	18,300.00	16,915.75	1,493.87	36,709.62	1,500.00	1,675.35	3,175.35
Rhode Island.....	40,530.00	40,046.35	9,153.58	89,729.93	1,000.00	9,565.59	11,065.59
Rhode Island.....	6,762.00	5,587.34	2,208.96	14,558.30	1,500.00	2,292.23	2,521.16
South Carolina.....	31,760.00	24,311.81	12,698.61	68,770.42	1,228.93	2,690.92	4,190.92
South Dakota.....	79,179.00	17,708.66	73,617.73	224,505.39	1,500.00	2,471.12	3,971.12
Tennessee.....	26,643.00	15,455.54	11,623.77	53,722.31	1,500.00	1,754.38	3,254.38
Texas.....	86,781.00	524,602.86	611,383.86	1,992,767.72	667.96	2,038.75	2,706.71
Utah.....	6,762.00	5,587.34	2,208.96	14,558.30	1,000.00	1,675.35	2,675.35
Vermont.....	31,760.00	24,311.81	12,698.61	68,770.42	1,500.00	2,292.23	2,521.16
Virginia.....	79,179.00	17,708.66	73,617.73	224,505.39	1,500.00	2,471.12	3,971.12
Washington.....	26,643.00	15,455.54	11,623.77	53,722.31	1,500.00	1,754.38	3,254.38
West Virginia.....	86,781.00	524,602.86	611,383.86	1,992,767.72	667.96	2,038.75	2,706.71
Wisconsin.....	66,221.23	66,221.23	66,221.23	198,663.69	1,530.18	1,530.18	3,060.36
Wyoming.....	66,221.23	66,221.23	66,221.23	198,663.69	1,530.18	1,530.18	3,060.36
Administration and inspection.....	66,221.23	66,221.23	66,221.23	198,663.69	1,530.18	1,530.18	3,060.36
Total.....	1,534,536.03	2,965,991.01	828,730.73	5,329,257.77	53,081.29	145,748.52	198,829.81
Forest-taxation and insurance study.....	32,621.44	---	---	---	---	---	---
Unexpended balance.....	20,355.53	---	---	---	21,648.71	---	---
Total appropriation.....	1,587,513.00	---	---	---	74,730.00	---	---

COOPERATIVE PROTECTION OF STATE AND PRIVATE FOREST LANDS FROM FIRE

Approximately 221,000,000 acres of State and private forest or potential forest land were reported by the States as under some form of organized protection from fire. This was 53 percent of the total of these lands (414,000,000 acres) classed as needing protection.

Table 2 shows a total of \$3,794,722 of State and private funds spent in cooperative forest-fire protection in the fiscal year 1934. The corresponding totals for the fiscal years 1931, 1932, and 1933 were \$5,011,421, \$4,370,274, and \$3,141,445. Thirty-nine States cooperated, as against 38 in the previous fiscal year. Arkansas undertook the work for the first time, under a budget which was made possible largely by contributions from private agencies. Private expenditures for protection provided independently of the organized protective system of course do not appear in table 2; their amount, though undoubtedly substantial in the aggregate, is unknown.

The total area of protected State and private land reported as burned over in the calendar year 1933 was 3,342,690 acres (of which 641,500 acres are classed as not having productive value), as against 3,233,610¹ acres in 1932, and of unprotected forest lands 40,166,900 acres, as against 38,410,000 acres in 1932. The 2,701,190 acres of protected productive forest land reported as burned over comprised 1.22 percent of the forest area protected. Of the State and private land burned over in 1933, 92 percent was outside of protected units. The number of fires reported on the protected units was 48,770, as against 55,567¹ in 1932. Of the 1933 number, 22.7 percent were reported as incendiary, as against 28.2 percent in 1932.

The fiscal year 1934 was a period of marked intensification of the protection effort within protected units, rather than of extension of protection to additional areas. This intensification was made possible by the President's Emergency Conservation Work program, which placed Civilian Conservation Corps camps at the disposal of the State agencies wherever the work of the Corps could be an integral part of Federal cooperative projects carried on under existing legislation. The first year's contribution to the cooperative protection of State and private land included the building of 6,878 miles of telephone line, 14,279 miles of firebreaks, and 15,298 miles of roads and trails; the erection of 213 new look-out towers, 53 look-out houses, and many other improvements; the reduction of fire hazards on 380,853 acres; and a substantial amount of roadside and trail clearing. All this made a major permanent contribution to the cooperative protection enterprise.

It was made under agreement with the States that the improvements will be maintained and used. This will mean a substantial increase in the effectiveness of fire-protection effort within the improved areas. It will also mean increased expense to the States in the maintenance and operation of the improvements. It does not mean that smaller funds will be needed in the future for this enterprise. A larger Federal appropriation for this work is a major need of forestry today.

A very substantial stimulus should be given to protection from fire on State and private lands by the adoption of the lumber code, which became effective on June 1, 1934. Under the terms of the code, each operator is specifically held to the prevention and control of fire on operating areas. He is also obligated, where a general fire-protection system is in effect, to correlate his protection system with the general system. Furthermore, where such a system is in effect, or offered, the conservation committee of each code division is to cooperate with public agencies in efforts to bring into the system all forest lands, with each ownership contributing its pro rata share of protection costs. The importance of the opportunities thus presented for extending protection to new areas can hardly be overstressed. It is, of course, yet to be determined to what extent these opportunities will be made use of. The Forest Service and the States may well set up as a primary objective the extension of protection by this means.

COOPERATION WITH STATES IN TREE PLANTING

In the calendar year 1933, 21,970,000 trees distributed by States cooperating under section 4 of the Clarke-McNary law were planted in windbreaks, shelter belts, and farm wood lots by farmers. This was 7 percent less than in 1932.

¹ Figures corrected from last year's report.

The initiation of a cooperative project with South Dakota brought the total of cooperating States to 39, in addition to Puerto Rico and Hawaii. None of the State projects was discontinued, in spite of substantial reductions in State budgets and the fact that it was necessary to reduce the maximum initial allotment to a single State from \$2,000 to \$1,500. The small Federal assistance continued to prove its importance as a stabilizing force. Approximately 22,000 acres was added to forest plantations on farms. The leading States in the number of trees distributed were Pennsylvania, New York, Puerto Rico, Tennessee, Indiana, Georgia, Nebraska, Wisconsin, and New Jersey, each of which distributed more than 700,000 trees.

State forest nurseries played an important part in supplying trees for the erosion-control work of the Civilian Conservation Corps. Of the stock raised as an integral part of the State cooperative projects, 1,330,000 trees were contributed to the corps for planting on national forests. A total free contribution of 11,820,000 trees was made by the States for E. C. W. planting. Of this total, 2,091,000 trees were planted on municipal forest areas, 8,383,000 on State forest areas, and 16,000 on private land. Beyond this, the facilities of the State nurseries were utilized, with extensive additions, to enable the C. C. C. to grow in them last year approximately 40,000,000 trees for erosion-control planting. The stimulus of Federal cooperation and the assistance which it extended brought about the original establishment of most of the State nurseries, and aided their upbuilding; and but for this stimulus it is highly improbable that means would have been at hand for getting the erosion-control work of the C. C. C. quickly under way on anything like the same scale of operation or with equally successful results in production.

COOPERATION WITH STATES IN FARM FORESTRY EXTENSION

Federal cooperation in farm forestry, authorized under section 5 of the Clarke-McNary law, is conducted as a part of the extension program of the several State agricultural colleges and is administered by the Extension Service of the Department of Agriculture, with the cooperation of the Forest Service.

The purpose of the work is to make known to farmers, through practical demonstrations directed by specialists in farm forestry, where, how, and through the use of what methods they can benefit by growing timber either for sale or for home use and farm betterment. Assistance is rendered toward increasing farm incomes and reducing expenditures through skillful methods of timber production and utilization; toward reclaiming eroding and idle lands through tree planting to check soil wastage and put the unprofitable lands to use; and toward modifying local weather conditions on the farm by establishing protective windbreaks and shelterbelts.

Thirty-three States and two Territories carried on this form of cooperative extension work. Georgia had 3 specialists, New York and Pennsylvania 2, and the others 1 each. Arkansas, Iowa, and Hawaii discontinued their projects. Assistance in forest management was given on 8,953 farms with 898,484 acres of woodland; on 6,514 farms 18,659 acres were planted with small trees for timber production; on 6,517 farms timber was set out for windbreaks; on 2,349 farms cleanings were made for controlling white pine blister rust; and on 11,632 farms assistance was given along other lines of woodland forestry, including marketing or estimating timber, fire prevention, and maple-sirup or crude-turpentine production.

The 4-H club activities in forestry enrolled 15,489 members—11,553 boys and 3,936 girls. This was a drop of less than 2 percent, following an increase of 48 percent the previous year. Projects were completed by 11,938 members, mostly in timber-stand improvement by thinning, weeding, or pruning, forest planting, tree identification, and timber estimating.

NATIONAL-FOREST ADMINISTRATION

The expenditures for national-forest administration, protection, improvement, reforestation, and extension, totaling \$68,004,335.94, are shown in detail on pages 49 and 50.

The appropriations and allotments of Federal funds for the national-forest enterprise in the fiscal years 1933, 1934, and 1935 are shown in table 3.

TABLE 3.—*Appropriations of Federal funds and allotments from the National Recovery Administration for the national-forest enterprise, 1933-35*

Item	1933	1934		1935		
		Appropriation	Allowed expenditure ¹	Regular appropriation	From N. I. R. A. allotment ²	Total
Appropriations:						
General expenses of administration, protection, and improvement.....	\$7,483,824.00	\$6,896,699.00	\$6,047,321	\$5,876,445	\$450,970	\$6,327,415
Specifically for:						
Fire control.....	1,125,000.00	536,900.00	524,450	100,000	12,487	112,487
Improvements, tree planting, etc.....	1,371,470.00	1,381,814.00	367,652	30,910	350,358	381,268
Land acquisition.....	200,000.00	85,854.00				
Forest development roads and trails (construction and maintenance).....	8,227,302.60	260,343.30	250,000			
Forest highways (construction and maintenance).....	10,905,000.00	4,457,400.00	4,457,400	1,500,000		1,500,000
Allotments from the National Recovery Administration for: ³						
Land acquisition.....		20,000,000.00	20,000,000			
Improvements, tree planting, etc.....		15,982,745.00	14,982,745			
Forest development roads and trails (construction and maintenance).....		10,000,000.00	10,000,000			
Forest highways (construction and maintenance).....		15,000,000.00	15,000,000			

¹Amounts left after applying the restrictions ordered by the Bureau of the Budget under the general economy program.

²The regular Forest Service appropriations requested for 1935 were reduced \$1,000,000 by the Bureau of the Budget in view of the availability of an equal sum set aside for the purpose from the 1934 National Recovery Administration allotment of \$15,982,745 for "Improvements, etc.," shown above. The entries in this column account for \$813,815 of the total \$1,000,000; the balance was assigned to research projects, as shown on p. 37.

³ Available until June 15, 1935.

The second item in the 1934 column of table 3 is greater by \$412,000 than the corresponding sum shown in last year's report. As usual, the nominal amount appropriated in advance for fire-fighting expenditures was supplemented by a deficiency appropriation to replenish other funds drawn upon, making the total the amount shown in table 3.

THE NATIONAL-FOREST PROPERTIES

The gross area of the national forests on June 30, 1934, was 188,037,023 acres, of which 25,445,899 acres were in ownership other than that of the United States, making the net area 162,591,124 acres. During the year the gross area increased 1,199,524 acres, the net area 581,979 acres. Eliminations by Presidential proclamation or Executive orders totaled 30,578 acres, and State selections under land-exchange agreements amounted to 711 acres. Additions by Presidential proclamation or Executive orders totaled 737,910 acres; by or under authority of acts of Congress, 433,452 acres; by acquisition of private lands through exchange, 30,653 acres; by purchase of administrative or look-out sites, 181 acres; and by donations of private lands outside of forest boundaries, 23,370 acres. Recomputations of gross area based on better data increased that area by 5,247 acres. Including in the net area 280,683 acres purchased under the Weeks law in units which have not yet been formally established as national forests, the total at the close of the year was 162,871,807 acres.

Table 4 shows the additions and eliminations.

TABLE 4.—*National-forest additions and eliminations, fiscal year 1934*

National forest	State	Additions	Eliminations
		<i>Acres</i>	<i>Acres</i>
Arapaho.....	Colorado.....	¹ 160	-----
Do.....	do.....	¹ 160	-----
Black Hills.....	South Dakota.....	¹ 520	-----
Boise.....	Idaho.....	² 257, 209	-----
Carson.....	New Mexico.....	¹ 2, 939	-----
Chequamegon.....	Wisconsin.....	³ 362, 660	-----
Clearwater.....	Idaho.....	⁴ 5, 172	-----
Do.....	do.....	⁴ 88	-----
Cochetopa.....	Colorado.....	² 164, 388	-----
Dixie.....	Utah.....	-----	³ 5, 821
Harney.....	Wyoming.....	¹ 342	-----
Do.....	South Dakota.....	-----	⁵ 229
Lassen.....	California.....	⁶ 160	-----
Do.....	do.....	⁶ 5	-----
Lolo.....	Montana.....	¹ 122	-----
Mendocino.....	California.....	⁶ 2	-----
Do.....	do.....	⁶ 1	-----
Modoc.....	do.....	⁶ 2	-----
Mono.....	do.....	⁶ 6	-----
Nicolet.....	Wisconsin.....	³ 375, 250	-----
Ochoco.....	Oregon.....	² 1, 808	-----
Pike.....	Colorado.....	² 9, 842	-----
Plumas.....	California.....	⁶ 2	-----
Rogue River.....	Oregon.....	¹ 9, 591	-----
Santa Fe.....	New Mexico.....	¹ 12, 983	-----
Shasta.....	California.....	⁶ 3	-----
Snoqualmie.....	Washington.....	-----	³ 24, 739
Do.....	do.....	¹ 2, 756	-----
Do.....	do.....	-----	⁵ 242
Do.....	do.....	-----	⁵ 240
St. Joe.....	Idaho.....	⁴ 9, 105	-----
Do.....	do.....	⁴ 9, 005	-----
Do.....	do.....	² 205	-----
Tongass.....	Alaska.....	-----	³ 18
Wenatchee.....	Washington.....	¹ 160	-----
Do.....	do.....	¹ 640	-----
Whitman.....	Oregon.....	¹ 280	-----
Total.....	-----	1, 225, 566	31, 289

¹ Private lands acquired through exchange.² Made under acts of Congress.³ Made by Presidential proclamation or Executive order.⁴ Made by donation of private lands.⁵ Made through State selections of exchange lands.⁶ By purchase for administrative use.

The major increase in gross area was effected through proclamations formally establishing as national forests the Chequamegon and Nicolet areas in Wisconsin, in which lands are being purchased under the Clarke-McNary law. Next in magnitude were the additions to the Boise Forest in Idaho and the Cochetopa Forest in Colorado, by specific acts of Congress. The major eliminations were 5,821 acres from the Dixie Forest in Utah, by which the Cedar Breaks National Monument was transferred to the National Park Service, and 24,739 acres from the Snoqualmie Forest in Washington, comprising an area almost entirely in private or State ownership. The next largest additions were brought about through exchanges and donations involving lands outside the national-forest boundaries. The remaining adjustments were of minor character.

As a measure of economy the Pend Oreille Forest in Idaho was partitioned between the Coeur d'Alene and Kaniksu Forests; while the Natural Bridge Forest in Virginia was combined with the George Washington Forest. Several interforest adjustments were made by the establishment of new dividing boundaries.

The incompleteness of the national-forest system is increasingly evident. In the Western States several million acres of unreserved and unappropriated public lands apparently are more valuable for timber production than for any other economic or social purpose. Intermingled with them are other lands important as watersheds and integrally related to the national-forest lands from a management standpoint. There are also strips or zones about the for-

ests largely made up of private lands which should be added by donations, exchange, or purchase. In the East no adequate management can be foreseen for a large part of the forest land except under Federal ownership. The true proportions of the situation are being disclosed by the land-planning studies now in progress. Decisive and realistic action is needed in deciding upon the future Federal forest policy and program. If the remaining unreserved and unappropriated public lands chiefly valuable for forest and watershed purposes are to be devoted to these purposes permanently, legislation to that end should be enacted without delay. If the Federal Government is to enlarge its forest-acquisition program, its objectives will be attained most effectively and least expensively by the prompt formulation of a specific long-term program embodying a clear-cut authorization of the essential appropriations.

LAND ACQUISITION THROUGH EXCHANGE

Private ownership of lands within and adjoining the national forests creates many difficult problems of protection, management, and use. The inside State and private lands total more than 25,000,000 acres, of which more than one-half should be managed in common with the public properties. Wherever railroad land grants traverse the forests, every alternate section surveyed before the forest was set aside is alienated. The school land grants passed 2 and in some instances 4 sections out of each township to State ownership upon survey, if this preceded withdrawal for national-forest purposes. Added to these large-scale alienations are tens of thousands of tracts patented or entered under the various public-land laws. Immediately surrounding the national forests are both private and State lands that will serve their highest purpose under national-forest administration.

When exchanges of national-forest land for private lands began it was with a view to consolidating both classes of holdings. In time this was broadened to allow the granting of equal values of national-forest stumpage in exchange for private lands. One or both of these courses of action have been authorized in a total of 57 acts of Congress, of which the most recent is the act approved April 30, 1934. Through them notable progress has been made in adjusting private and public ownerships. Under present conditions private owners do not, as a rule, want more land but increasingly prefer to liquidate by exchanging their properties for national-forest stumpage susceptible of early sale or utilization.

Extensive use of national-forest stumpage for exchange purposes, however, has two difficulties. By diminishing the cash receipts from timber sales, it reduces the 25-percent share of all national-forest receipts payable to the counties. A more recent difficulty is to correlate the cut with that allowable under the lumber code. To protect the counties, the Forest Service generally has adhered to the rule that the value of the stumpage granted in exchanges in any State during any year shall not amount to more than 10 percent of the cash receipts from timber sales in the same State and year. The falling-off in timber-sale receipts during the past several years has correspondingly reduced the acreage of land obtainable through exchange.

If the consolidation of the public properties is to be accomplished on a scale adequate in acreage and in time to the present and prospective requirements of the economic situation, an increase will be necessary in the proportion of immediately salable national-forest stumpage employed to acquire private lands through exchange, or else acquisition will have to be accelerated by extension to the western national forests of the program of cash purchases of forest lands hitherto effective only in the eastern half of the country. A combination of the two methods seems to be the logical solution. Cases have arisen in which established operating companies have lacked funds with which to purchase national-forest stumpage necessary for the continued operation of a mill, but have been willing and eager to convey their privately owned cut-over lands in exchange therefor. If the mill closed, unemployment conditions would be aggravated and real economic distress caused the dependent communities. Where this situation existed, the counties concerned took the initiative in advocating a departure from the 10-percent limitation, holding that the benefits from continued operation of the mill far outweighed the sacrifice of receipts. A wider acceptance of this view may result in considerable stimulation of the land-exchange activity. However, a real attack on the private-land problem will require that the exchange authority be supplemented

by a program of extensive purchases. The magnitude and urgency of the problem call for accelerated action on so large a scale that its financing through some form of bond issue may be advisable.

During the year agreement was reached with the State of Colorado whereby that State will select approximately 70,000 acres from lands now within the Routt National Forest in exchange for an equal area of widely distributed school sections and other State lands. Through this exchange the State will own a compact area of diversified forest land, not far from the State forest school. Marked progress was made in the pending exchange with the State of New Mexico, much of the offered and selected lands having been appraised and the first selection lists filed. In Michigan a new application of the Weeks law was worked out when the National Forest Reservation Commission approved a proposal of the State conservation department that the Federal Government, instead of buying State lands within national forests, should purchase private lands of equal value within State forests and exchange them for the State holdings in the national forests. In this way practically twice as much forest acreage will be placed under public management.

Between January 1, 1933, and June 30, 1934, reconveyances to the United States of 155,946 acres of private lands in exchange for 19,763 acres of national-forest land and 108,318,000 board feet of national-forest stumpage, valued at \$661,974, increased the net national-forest area by 136,183 acres. In this same period a total of 155 exchange cases was approved by the Secretary of Agriculture and referred to the Secretary of the Interior for further action. They offered 303,969 acres of privately owned land in exchange for 110,559 acres of national-forest land and \$468,678 worth of stumpage. In all, to June 30, 1934, 1,036 land-exchange cases have been consummated. Through them the United States has acquired 1,555,407 acres of land, valued at \$5,930,023, in exchange for 452,389 acres of national-forest land, valued at \$2,063,776, and 1,095,455,000 board feet of national-forest stumpage, valued at \$3,052,088. Besides a net gain of 1,103,018 acres in national-forest area, the acquired lands support a much larger volume of stumpage than that granted in exchange for them, while Federal management of the acquired lands eliminates many previous difficulties of protection, administration, and utilization.

LAND ACQUISITION THROUGH PURCHASE

The progress made last year in forest-land acquisition under the Weeks and Clarke-McNary laws approached the total of the entire preceding 22 years. This was due to an allotment by the President of \$20,000,000 from the funds made available by the Emergency Conservation Act of March 31, 1933. Approval of 28 new purchase units increased the number from 41 to 69, situated in 23 of the States east of the Great Plains and in Puerto Rico. Substantial enlargements of a number of previously established units also were authorized, raising the gross area of the approved purchase units from 16,589,387 acres to 31,399,662 acres. The 4,206,560 acres approved for purchase during the year brought the total approved to 9,588,884 acres. Including 2,227,395 acres reserved from the public domain and 252,418 acres acquired through exchanges, the United States now owns or is in process of acquiring 12,068,697 acres of land within the national forests in the eastern half of the United States. This is slightly less than one-half of the area within the established purchase units that should be federally owned to make their purpose and service fully effective.

Each new unit or large addition was designed to meet some clear requirement of public interest and welfare. One embraces an additional section of the Green Mountain Range, in Vermont. Another, in West Virginia, includes critical sections of the Ohio River drainage. A new unit in Virginia and several large additions in North Carolina, Tennessee, and Georgia are designed to protect the upper headwaters of the Tennessee River and the important engineering works now in progress on that drainage. An extension of the Cumberland unit in Kentucky embraces land important both as forest and as watershed. Two units in North Carolina and two in South Carolina include critical parts of the piedmont region, while another in North Carolina embraces an important segment of the coastal pine-forest types. A new unit in Florida insures constructive management of an important forest area in that State. In Mississippi five new units were created, partly to promote forest conservation, but in a large measure to facilitate control of critical erosion problems.

A large addition in Louisiana is exceptionally important both for timber production and for watershed protection. Four units were established in Texas, largely in aid of forest conservation, and six in Missouri, all on important watersheds, but important also for their potentialities of timber production and consequent contributions to better economic conditions. Two new areas were created in southern Illinois, one on the drainage of the Ohio River, the other directly tributary to the Mississippi. A new unit was created in the lower peninsula of Michigan, and large additions were made to the three existing units in the Upper Peninsula. In Wisconsin the existing units were greatly extended, and in Minnesota a new unit was created. Approval of two purchase units in Puerto Rico will contribute to the development of a new land economy in that island. Consideration was given tentatively to establishing a purchase area in the California redwood region, since the national forests now contain no adequate examples of the redwood-forest type, but thus far no area finally has been selected and approved.

A number of States in which Federal acquisition of forest lands hitherto has been unauthorized or restricted are exhibiting keen interest in obtaining the establishment of new national-forest units within their borders. Iowa passed the act of consent required under the provisions of the Weeks law, and similar acts received consideration in Indiana and Ohio. Under the provisions of the Bankhead-Hill Act, approved June 14, 1934, the State consent prescribed by the Weeks law can be granted during the remainder of the calendar year by a governor, with the approval of a majority of the members of the legislative body. The Governor of Alabama has granted consent in relation to parts of the State where purchases previously had not been authorized, and examinations of suitable areas are now in progress.

In each instance where the establishment or enlargement of a purchase unit has been followed by offers and acceptances of lands, the objectives which inspired the initial action have been attained in abundant measure. Opportunities have been opened for employing members of the Civilian Conservation Corps in or near their own States instead of transporting them to remote regions, and for employing usefully large numbers of local citizens under the programs of the National Recovery Administration, the Civil Works Administration, and the Federal Emergency Relief Administration. The labor of the men thus removed from relief rolls contributed largely to the permanent betterment of public properties. Disbursements in payment for lands promptly found their way into local circulation through their use in payment of taxes and other debts, or for purchasing goods or hiring labor, or for betterment of plants, or for investment in other enterprises and resources, and thus contributed to the improvement of economic conditions not only locally but widely. At the same time the lands were acquired at prices substantially below those previously prevailing or which hereafter may prevail. The purchases may be ranked as sound public investment most opportunely made, from every standpoint. The net effect of the year's accomplishments equals all reasonable expectations.

During the year title was taken under the Weeks law, as amended by the Clarke-McNary law, to 574,025 acres, at a cost of \$1,310,789.41. Purchases totaling 4,206,560 acres and creating a total obligation of \$10,007,427.43 were approved by the National Forest Reservation Commission. The average price was \$2.38 per acre for the lands approved for purchase, and \$2.35 for the lands actually acquired, as compared with a previous average of \$4.54 for all lands acquired. At the close of the year the total actually vested in Federal ownership was 5,106,724 acres; its total cost, not including overhead, was \$21,890,815.06; and the average price per acre was \$4.29. The distribution of these lands is shown by States in table 5.

TABLE 5.—*Acreage of timberland purchased in the fiscal year 1934 and total purchases to July 1, 1934*

State	Pur- chased in 1934	Average price per acre 1934	Total purchased up to July 1934	State	Pur- chased in 1934	Average price per acre 1934	Total purchased up to July 1934
	<i>Acres</i>	<i>Dollars</i>	<i>Acres</i>		<i>Acres</i>	<i>Dollars</i>	<i>Acres</i>
Alabama.....	1,206	4.32	117,539	North Carolina.....	26,308	3.64	438,588
Arkansas.....	25,667	2.24	350,323	Oklahoma.....	1,888	1.57	60,788
Florida.....	12,059	1.69	246,423	Pennsylvania.....	1,409	6.26	372,564
Georgia.....	8,971	2.09	346,490	Puerto Rico.....			
Kentucky.....	189	2.25	189	South Carolina.....	42,035	3.97	89,637
Louisiana.....	13,020	1.66	91,257	Tennessee.....	3,566	4.35	392,339
Maine.....	300	3.13	33,781	Vermont.....			31,381
Michigan.....	85,739	1.76	394,922	Virginia.....	3,640	4.29	610,828
Minnesota.....	97,826	2.38	228,406	West Virginia.....	2,264	5.77	332,380
Mississippi.....	136,722	2.49	138,632	Wisconsin.....	100,773	1.20	318,859
Missouri.....	10,443	2.20	10,443				
New Hampshire.....			500,955	Total.....	574,025	2.38	5,106,724

COORDINATION OF NATIONAL PARKS AND NATIONAL FORESTS

Early in the year, 5,821 acres comprising the outstanding part of the Cedar Breaks formation were eliminated from the Dixie National Forest to facilitate the establishment of a national monument to be administered by the National Park Service. Later, under the provisions of an Executive order dated June 10, 1933, the 16 national monuments within national forests and also under withdrawal for national-forest purposes were transferred to the jurisdiction of the National Park Service.

The respective fields of the national parks and national forests have always been demarked on the basis of fundamental distinctions in their land-use objectives. National parks comprise land areas which have such outstanding values as scenic wonders or marvels of nature that the preservation of their values is a matter of national concern and requires rigid exclusion of commercial use of the lands and their resources for other purposes. National forests, on the other hand, are administered for multiple use. The basic principle throughout is that uses are to be coordinated under a master plan designed to realize the largest net total of public benefits. Timber production, water conservation, grazing use, recreational use, and other forms of land use must be planned for together. The establishment and maintenance of public camp grounds, local recreational resorts, wayside stopping places to view a distant vista or a picturesque glen or waterfall, and the like, are incidents of national-forest administration. They coordinate with and supplement such things as withholding timber from sale or restricting its cutting on lake shores and close to highways, locating roads with regard for scenic attractiveness and preventing their disfigurement by unsightly structures or conditions, making pasturage available for the horses and pack animals of vacationists, reserving primitive areas from commercial development, and a veritable host of similar matters of administrative concern. National-forest administration is integral, and separate jurisdiction either over limited areas or specific activities, if carried out in any large way, would lead to chaos.

Toward the close of the Seventy-third Congress a bill was introduced for the enlargement of the Grand Teton National Park, Wyo., under which minor parts of the Teton National Forest would have been given a national-park status. The report of the Department of Agriculture acquiesced in the proposed action, but the bill failed to pass.

NORTHERN PACIFIC LAND-GRANT ADJUDICATION

The suit authorized by the act of June 25, 1829, to adjudicate the equities of the Northern Pacific Railway Co. under the Land Grant Act of July 2, 1864, the resolution of May 31, 1870, and other supplementary laws, continued during the year to receive the attention of the court. As most of the activities involved were of a legal nature and handled by the Department of Justice, participation by the Forest Service was limited to the provision of information and evidence as required by the progress of the case.

LAND ACQUISITION THROUGH DONATIONS

Of lands previously donated under the provisions of section 7 of the act of June 7, 1924 (43 Stat. 653), title to 23,370 acres finally was accepted and vested in the United States during the year, with early probability of similar action on the remainder of the offered lands. Notwithstanding the temporary cessation of offers of donation, all circumstances indicate that a great deal of forest land eventually will be conveyed to the United States under the acts above cited.

PURCHASES AND DONATIONS OF LANDS FOR ADMINISTRATIVE PURPOSES

Under the provisions of the acts of March 3, 1925 (43 Stat. 1132), and June 16, 1933 (48 Stat. 195), 52 small tracts of land, involving an expenditure of \$47,500, were purchased for use for administrative purposes. Title papers for the purchase of 16 additional sites were forwarded to the Department of Justice for approval. The Secretary of Agriculture accepted title to 27 tracts of land donated for the same purposes, in accordance with the act of March 3, 1925.

SPECIAL USES

At the close of the fiscal year 37,969 special-use permits were in effect, as against 37,265 for 1933. Of the permits in effect, 17,933 were without charge, while 20,036 were subject to annual rental charges. The special-use receipts for the fiscal year 1934 were \$297,830.75, an increase of \$19,648.40 over the preceding year, possibly due in part to the payment of notes given for the preceding year's fees.

The bill to authorize a maximum area of 80 acres for term permits issued under the act of March 4, 1915, was not acted upon by the Seventy-third Congress. The present limitation of 5 acres is wholly inadequate to permit of proper types of development and service, so that it is now necessary to issue one or more supplemental permits of a terminable character. Their consequent insecurity of tenure is a serious obstacle to financing developments. The national forests contain many areas suitable for occupancy by summer homes, resorts, etc., without any conflict with the major purposes for which the forests were created and without appreciable difficulties of administration and management. These areas are distinct economic assets to the regions of which they are parts, and their complete development and use not only adds to public enjoyment of the national forests but also increases the tax base and the income to the Federal Treasury and to the counties. Per acre actually occupied, the cash income from the special-use occupancy far surpasses that from any other form of national-forest use. The creation of conditions under which such uses may be expanded and brought up to higher standards would be wholly in the public interest.

CLAIMS AND SETTLEMENT

During the fiscal year reports on applications for homestead patents totaled 60, of which 59 were favorable and 1 unfavorable; while reports on applications for mineral patents numbered 45, of which 33 were favorable and 12 unfavorable. There were comparatively few applications or appeals for the reclassification and listing of national-forest lands under the forest homestead law. The most noteworthy development of the year in relation to claims was the passage by Congress of the acts approved May 11 and 26, 1934, the first relating to part of the Mount Hood National Forest, in Oregon, the second to parts of the Wasatch National Forest, in Utah. While authorizing mineral locations within the described areas, the acts provide for the retention by the United States of rights of control and use of the surface of such locations, thus lessening the tendency to locate mining claims primarily to establish title to valuable lands for purposes other than mining. This principle might well be extended to other national-forest lands.

PROTECTION FROM FIRE

For the national forests the 1933 fire season was, on the whole, much like that of 1932. It was full of dangerous possibilities, but with localized excep-

tions was nearer an average than a bad fire year. But the wide spread of the national forests throughout the country and the complete lack of uniformity in weather conditions over so great an area, with its various regions, make a composite picture of the fire season very misleading. Somewhere each season highly critical conditions have to be met. The most disastrous forest fire in 2 decades, the Tilamook fire in northwestern Oregon, occurred during 1933. It was outside of the national forests and is mentioned only as an example of the kind of local situation which may develop in any year. Abnormally dangerous fire conditions also prevailed in southern California, where for 13 of the past 17 years the precipitation has been subnormal, and where at best the moisture supply is insufficient to maintain a vigorous fire-resistant forest cover. Of the total area burned on all of the national forests in 1933 practically 50 percent was in this part of California.

Critical conditions developed also in the eastern Montana and central Idaho forests and parts of Wyoming and South Dakota. In the Lake States the 1933 fire season was extremely severe throughout.

One reason why 1933 was a year of only moderate fire danger was the relatively small number of incendiary fires, in sharp contrast with 1932, when many of the worst fires were incendiary. There was a 44-percent decrease in fires of this class. The C. C. C. made available a fire-fighting force already organized and in the forests, and largely reduced the temptation to set fires for the sake of employment. Further, incidental to the maintenance and operation of the E. C. W. camps, a large number of trucks, both Army and Forest Service, were traveling the roads day and night. Each driver was a patrolman in fact, and a deterrent to the incendiarist. Another influence was the volunteer fire-warden organization, which was even more active last year than during the previous season.

The area burned was less than 0.1 percent of the total area within the national-forest boundaries. Only once before in the last 29 years has this record been attained. The total damage to national-forest resources was relatively small.

Aside from the fact that the fire danger was on the whole moderate, there were three chief reasons for the good record. One was the trained efficiency of the permanent organization in all details and phases of fire prevention, preparedness, and suppression. The recent ultracritical seasons had demanded, and vigorous executive management had produced, highly skillful and competently administered protection. A second reason was the increase that has been made during the past several years in the mileage of protection roads and in other protection improvements and equipment. The third reason was the great help afforded by the C. C. C., both in actual fire suppression and as a deterrent of incendiarism. Early in the season great emphasis was placed on adequate training and organization of each corps unit for fire-suppression work. With rare exceptions the men were willing and anxious to go to fires at any time, and they usually carried out instructions better than the crews ordinarily picked up in labor centers. Without the C. C. C. the area burned in California would probably have been more than twice what it actually was, and severe additional losses would unquestionably have been suffered in the Lake States.

Other expected means of improving fire-control performance include reinforcements in methods of determining and forecasting fire-danger conditions, improved detection technic to discover fires quicker, the location at strategic points of small groups of trained fire fighters ready to attack immediately when fires are reported, and the construction of permanent firebreaks. The most spectacular and one of the most useful of these barriers is the Ponderosa Way in California, which is under construction, with the cooperation of the State and other agencies. It should be a great help in preventing fires from entering the commercial-timber belt in California. Eventually it will be some 1,000 miles in length. These and other outlays for preparedness should save much more than their cost in lower suppression expenditures and smaller losses.

Table 6 shows the 1933 fire record, in comparison with that of 1932 and with the 5-year average for 1929-33.

TABLE 6.—*Comparison of fires on national forests, calendar years 1933, 1932, and 5-year average, 1929-33*

Item	Number of fires			Percentage of total		
	1933	1932	Average 1929-33	1933	1932	Average 1929-33
Class:						
Burns of 0.25 acre or less.....	3,626	4,146	4,241	57.42	58.92	56.31
Burns of between 0.25 and 10 acres.....	1,777	1,811	2,027	28.14	25.73	26.92
Burns of 10 acres and over.....	912	1,080	1,263	14.44	15.35	16.77
Total.....	6,315	7,037	7,531	100.00	100.00	100.00
Cause:						
Railroads.....	94	88	162	1.49	1.25	2.15
Lightning.....	2,307	2,690	3,089	36.53	38.23	41.02
Incendiarism.....	708	1,268	1,099	11.21	18.02	14.59
Debris burning.....	305	283	324	4.83	4.02	4.30
Lumbering.....	90	49	94	1.43	.69	1.25
Camp fires.....	698	748	771	11.05	10.63	10.24
Smokers.....	1,809	1,565	1,619	28.65	22.24	21.50
Miscellaneous.....	304	346	373	4.81	4.92	4.95
Total.....	6,315	7,037	7,531	100.00	100.0	100.00

Calendar year	Total area of national- forest land burned over	Total dam- age of national- forest land burned over	Total cost of fighting fires, exclu- sive of time of forest offi- cers
1933.....	<i>Acres</i> 132,147	<i>Acres</i> 324,758	<i>Dollars</i> 1,935,339
1932.....	372,973	568,349	997,418
5-year average, 1929-33.....	394,981	1,846,600	2,075,511

¹ \$593,532 of this amount were E. C. W. funds.

THE 1934 FIRE SEASON

In severity the 1934 fire season in many sections was probably the worst since organized protection began. The extremity of drought throughout the Lake States and west of the Mississippi is too well known to require comment. In north Idaho, Oregon, Washington, and some other parts of the West June rains were plentiful; but a long period of unprecedented heat and wind, coupled with dry lightning storms, followed. On the whole the season is rated as more difficult than even the catastrophic years of 1910, 1919, 1924, 1926, 1929, and 1931. Had protection not been better organized and better equipped with facilities and available man power than in those years, losses of the same order, if not of even greater magnitude, could hardly have been prevented.

Largely because of the presence of the C. C. C. and the organized P. W. A. crews engaged in numerous forms of forest-cultural and improvement work, the losses were well in hand. The large increase in mileage of roads and trails and in other protection improvements constructed since the beginning of the emergency conservation work also helped enormously. Man power and facilities, however, are merely tools, though indispensable tools, for the protective force to utilize as skillfully as its organization, training, experience, and expertness make possible. The results obtained attest the progress that has been made through the years in developing an efficient protective force and system of control.

The area burned on the national forests to August 20 was 310,000 acres, as against an average of 174,000 acres during the same period in the 3 previous years. Compared with 1931, the last of the previous "bad" seasons, 72,000 acres less was lost. Of the two, the 1934 season was much the harder to cope with. More than one-third of the area lost was in the northern Rocky

Mountain region and in very large part was land that had been swept by fires in previous years. The destruction of standing timber was therefore far less than would normally have resulted; the effect on watershed protection will probably be the most serious consequence.

The cumulative effect of drought has long been apparent in the western national forests. For nearly 15 years the records have shown a rapidly mounting deficiency of precipitation. The resulting shortage of ground waters affects the vegetation, reduces the moisture content of the forest cover as a whole, shrinks the streams and springs, and makes the forests more inflammable during the annual dry season. The extreme drought of 1934 capped a climax. That even under the adverse conditions of an unprecedented season the losses were far less serious than during earlier outstanding "bad" years evidences the strength of the organized system of fire control which has been laboriously built up.

In 1934, 17 Forest Service employees were killed while in fire-suppression work. Their names follow. One was a veteran of the permanent organization, John S. Everitt, supervisor of the Shasta National Forest, in California, who was trapped and burned to death in a fire on the slopes of Mount Shasta. *C. C. C. workers:* Joseph W. Howard, Leroy McGinnes, Lester L. Johnston, John D. Bromet, Walter Kolniak, Edward P. Cruse, William Mattison, Russell Blakely, and Robert Jonutz. *Other employees:* James Owens, William H. Gillespie, Will Swift, Raymond Ledvina, Claud C. Shannon, John S. Everitt, and Walter Glen Thompson.

PROTECTION FROM TREE DISEASES, INSECTS, AND RODENTS

The white pine blister rust continues to be the most serious tree disease threatening the national forests. Its chief immediate menace to these forests is in the West, where in two separate regions extensive bodies of virgin timber containing as their most valuable species superb stands of white pine in great quantity are endangered. Without control, the disease would in all probability not only kill virtually all the mature white pine in these regions within a few years but also eliminate the tree itself as a component of the forest and a source of future supplies of one of our most useful and valuable woods.

White pine blister rust first made its appearance in the East, where it was introduced from Europe early in the present century, on infected nursery stock. It attacks only the five-needled, or "white", pines, of which the three most important species in the United States as commercial timber trees are the northern white pine, found extensively in the Appalachian Mountains, the Northeastern States, and the Lake States; the western white pine, found mainly in the heavily forested portions of western Montana, northern Idaho, and eastern Washington; and the sugar pine of California, which reaches northward into southern Oregon. Control is accomplished by eradicating the alternate host-plants of the disease—shrubs of the genus *Ribes*. In the eastern part of the country the fight against the blister rust has been under way for 18 years, but without involving the eastern national forests to any great extent, since most of the lands concerned are privately owned. But the national-forest holdings in the western white pine and sugar pine regions are extensive, and very large money values are at stake.

The western outbreak of the disease entered the country from British Columbia, where it was first introduced directly from Europe in 1910. It has spread southward to the edge of the sugar pine, and eastward into the western white pine stands of the "Inland Empire." So far, its southward movement has not carried it farther than about 50 miles north of the California line; and while the situation there is being watched carefully and control measures are being applied experimentally on a considerable scale, it is not yet certain that the conditions make advisable an immediate launching of extensive operations with a view to conquering the invasion. But in the "Inland Empire" region the disease gives every promise, if not quickly checked, of rapidly eliminating white pine from the forest and wiping out the entire local white pine lumber industry.

The methods of control used by the Forest Service are recommended by the Bureau of Entomology and Plant Quarantine, which handles all control work on lands outside the national forests and with which the Forest Service cooperates very closely. It is now estimated that the white pine lands within the

national forests of the "Inland Empire" region that justify control operations because of their high productivity approximate 1,500,000 acres. The Forest Service attempts control only where the values at stake justify the financial investment. The work has been under way since 1930, but not until 1932 were funds available to carry it forward on a comprehensive scale. The C. C. C. and the availability of additional funds from P. W. A. appropriations made possible last year a great enlargement of the work. By June 30 about 500,000 acres had been cleared of gooseberries and currants, the alternate host plants. This means that the initial job is about one-third completed.

As in previous years, bark beetles were responsible for the most serious insect infestations on the national forests. The winter-killing of December 1932 and February 1933 mentioned in last year's report greatly reduced the volume of infested ponderosa and lodgepole pine in Oregon, but it did not end the epidemic. Much of the remaining infestation was concentrated in groups of trees. During the winter of 1933 and the spring of 1934 the most dangerous of these group infestations on the Ochoco and Deschutes National Forests were treated. The work involved felling and peeling 16,500 trees and burning the bark. It is hoped that additional areas on these forests this fall can be treated by the C. C. C. In the vicinity of Sun Pass on the Rogue River National Forest, Oreg., a beetle infestation in lodgepole pine, which had been checked by the freeze but was showing vigorous recovery and threatened the timber stands on the Crater National Park, was controlled in the spring of 1934 by felling and treating 6,500 trees. For several years intensive control has been conducted by the National Park Service and the Forest Service on lands within and adjacent to the park, and with the completion of this project the park is believed to be completely free from beetle infestation.

In northern California the effects of the winter killing were about the same as in Oregon. It was found necessary on the Modoc National Forest to institute control on two areas where the infestation showed a distinct upward trend, and in cooperation with private owners 5,828 ponderosa pine trees were treated. In the late fall of 1933 and the early spring of 1934 a number of control operations were conducted on the Sierra and Stanislaus National Forests, in central California, and approximately 6,000 trees were treated.

In Idaho the control work which has been carried on for several years in the valuable white pine stands of the Coeur d'Alene National Forest was brought to a successful conclusion in the fall of 1933, with the treatment of 890 trees. This area was so free from infestation in the spring of 1934 that the Bureau of Entomology and Plant Quarantine was unable to find enough infested trees for experimental purposes. On the Kootenai National Forest, in Montana, where beetle control operations in white pine have been in effect for a number of years, 2,570 trees were treated in the fall of 1933, and it is believed that this very troublesome epidemic has been brought under control.

In the fall of 1933 treatment was again given to the Douglas fir stands along the North Fork of the Shoshone River, Shoshone National Forest, just east of the Yellowstone National Park. The infestation of bark beetles followed an attack by the spruce bud worm, which weakened the stand and made it susceptible to beetle infestation. The beetles have been gradually brought under control, and last fall's project was largely a clean-up job, since the attacks had become very scattered. The area treated contains a number of resorts and summer homes and is traversed by the main road to the Yellowstone Park east entrance.

The lodgepole pine infestation on the Cache, Wasatch, and Ashley National Forests is nearly or quite under control except for three areas on the Provo River which were given treatment last spring by spraying with oil and burning 10,600 trees.

Grubs of the June beetle, favored by the dry summers of the last 5 years, have become a real problem in connection with the successful establishment of tree plantations in the Lake States. An intensive study to find some means of control was carried on by the Bureau of Entomology and Plant Quarantine. The grubs, which live in the ground 3 years before emerging as beetles, cut off the small feeder roots and peel the cambium from the larger roots, thus causing the death of the young trees.

Rabbits also have become a source of considerable concern in connection with our Lake States plantations. The snowshoe rabbit varies in population over a 7- to 9-year cycle, becoming exceedingly numerous just at the end of the cycle. When the rabbits are plentiful they do much damage. Last fall and winter, in cooperation with the Bureau of Biological Survey, an intensive control campaign was undertaken with the aid of the C. C. C. The work was largely experimental. It will be necessary to continue the effort until the number of rabbits is reduced through control or through natural agencies.

TIMBER

The upturn in receipts and quantity of timber cut from the national forests, begun in the last quarter of 1933, continued throughout the fiscal year 1934. The cut under timber sales and land exchanges was 674,541,000 board feet, as against 473,910,000 board feet in the fiscal year 1933 and 1,653,265,000 board feet in the peak year of 1930. This 42-percent increase over last year was due to renewed activity in sales made prior to the depression rather than to new business. In view of the condition of the lumber industry, production of lumber from national-forest timber has not been encouraged. A liberal policy has been followed in granting time extensions for the completion of agreements or for the removal of fixed amounts of timber. No offerings of timber for new lumber-manufacturing plants were made.

In reaction to the fixing of minimum prices and the control of production provided by the lumber code, the price of lumber strengthened during the year. There was also a pick-up in the demand for lumber about the middle of the year; but during the last quarter the demand fell off, and cutting quotas were further reduced.

Through the continued work of the Civilian Conservation Corps a large amount of stand improvement was accomplished. Notable instances are areas in the Black Hills and Harney National Forests of South Dakota, where some 400,000 acres of badly crowded and stagnated ponderosa pine stands are being thinned to make possible reasonable rates of growth; on the Chippewa and Superior National Forests, in Minnesota, where valuable Norway and white-pine stands are being thinned; and on the Cherokee, Nantahala, and Pisgah National Forests, in the southern Appalachians, where the removal of old, defective, inferior hardwoods, left from private operations before the areas were purchased for national-forest purposes, is releasing young stands of desirable species which otherwise could not produce valuable timber crops. Work of this nature is attempted only where it promises a return on the financial investment. It is hoped the work can be continued so that the forests on the better sites may be kept in a highly productive condition. Much of the wood cut on the cultural operations was removed under free permit by local inhabitants, often otherwise unemployed, for their own use as fuel and fencing material.

The number of small sales (transactions involving \$500 or less) was 16,304, and of large sales (transactions involving more than \$500) 129. Both showed an increase. No sales involving long-term contracts were made. The small sales constitute an increasingly important factor in supplying the wood needs of the local ranch and community citizenry adjacent to the national forests. During the depression, however, small sales have not been confined to meeting purely local needs. Many families visiting the national forests over week-ends combine work and pleasure. Trailers are attached to the family automobile, and a cord or two of wood taken home. People come to the forest for this wood from hundreds of miles away. The charge made for the wood is nominal.

The national-forest timber-sale business for the fiscal year is summarized in tables 7 and 8.

TABLE 7.—Quantity and value of national-forest timber cut under sales, fiscal year 1934

State	Quantity cut			Value		
	Commer- cial sales	Cost sales	Total	Commer- cial sales	Cost sales	Total
	<i>Board feet</i>	<i>Board feet</i>	<i>Board feet</i>	<i>Dollars</i>	<i>Dollars</i>	<i>Dollars</i>
Alaska.....	22,648,000		22,648,000	35,373		35,373
Arizona.....	48,792,000	376,000	49,168,000	119,406	378	119,784
Arkansas.....	12,085,000	222,000	12,307,000	126,008	222	126,230
California.....	67,804,000	1,480,000	69,284,000	148,718	999	149,717
Colorado.....	23,667,000	769,000	24,436,000	52,410	703	53,113
Florida.....	2,437,000		2,437,000	9,006		9,006
Georgia.....	380,000		380,000	1,308		1,308
Idaho.....	39,703,000	4,364,000	44,067,000	132,159	3,916	136,075
Louisiana.....	271,000		271,000	119		119
Maine.....	30,000		30,000	64		64
Michigan.....	4,501,000	126,000	4,627,000	8,897	126	9,023
Minnesota.....	3,893,000		3,893,000	5,553		5,553
Mississippi.....	36,000		36,000	145		145
Montana.....	10,066,000	3,754,000	13,820,000	19,192	3,655	22,847
Nevada.....	460,000	227,000	687,000	356	182	538
New Hampshire.....	3,711,000		3,711,000	11,282		11,282
New Mexico.....	10,321,000	736,000	11,057,000	20,946	748	21,694
North Carolina.....	13,985,000		13,985,000	23,955		23,955
Oregon.....	68,004,000	3,303,000	71,307,000	130,980	2,126	133,106
Pennsylvania.....	1,266,000		1,266,000	4,552		4,552
Puerto Rico.....				2		2
South Carolina.....	354,000		354,000	1,153		1,153
South Dakota.....	20,165,000	374,000	20,539,000	39,723	375	40,098
Tennessee.....	1,936,000		1,936,000	5,056		5,056
Utah.....	8,835,000	2,077,000	10,912,000	17,813	2,115	19,928
Vermont.....	551,000		551,000	3,283		3,283
Virginia.....	6,314,000		6,314,000	7,442		7,442
Washington.....	186,730,000	178,000	186,908,000	400,700	140	400,840
West Virginia.....	239,000		239,000	643		643
Wisconsin.....	427,000		427,000	449		449
Wyoming.....	20,178,000	976,000	21,154,000	53,432	935	54,367
Total, 1934.....	579,789,000	18,962,000	598,751,000	1,380,125	16,620	¹ 1,396,745
Total, 1933.....	371,682,000	17,816,000	389,498,000	823,156	15,161	¹ 838,317

¹ In addition, minor products not convertible into board feet were cut, the value of which was \$25,783 in 1934 and \$18,524 in 1933.

TABLE 8.—Quantity and value of national-forest timber sold, fiscal year 1934

State	Quantity cut			Value		
	Commer- cial sales	Cost sales	Total	Commer- cial sales	Cost sales	Total
	<i>Board feet</i>	<i>Board feet</i>	<i>Board feet</i>	<i>Dollars</i>	<i>Dollars</i>	<i>Dollars</i>
Alaska.....	19,176,000		19,176,000	29,514		29,514
Arizona.....	4,659,000	370,000	5,029,000	11,519	390	11,909
Arkansas.....	20,983,000	241,000	21,224,000	217,496	241	217,737
California.....	58,813,000	1,922,000	60,735,000	89,943	1,304	91,247
Colorado.....	47,027,000	724,000	47,751,000	104,859	661	105,520
Florida.....	3,232,000		3,232,000	12,390		12,390
Georgia.....	582,000		582,000	2,033		2,033
Idaho.....	40,555,000	4,728,000	45,283,000	141,470	4,412	145,882
Louisiana.....	271,000		271,000	119		119
Maine.....	112,000		112,000	379		379
Michigan.....	5,576,000	29,000	5,605,000	10,651	29	10,680
Minnesota.....	1,484,000		1,484,000	2,020		2,020
Mississippi.....	245,000		245,000	389		389
Montana.....	18,096,000	4,002,000	22,098,000	44,505	3,904	48,409
Nevada.....	621,000	141,000	762,000	640	112	752
New Hampshire.....	10,953,000		10,953,000	33,334		33,334
New Mexico.....	10,056,000	909,000	10,965,000	20,123	906	21,029
North Carolina.....	25,918,000		25,918,000	35,390		35,390
Oregon.....	25,357,000	3,043,000	28,400,000	51,590	2,118	53,708
Pennsylvania.....	1,572,000		1,572,000	1,638		1,638
Puerto Rico.....				2		2
South Carolina.....	544,000		544,000	1,858		1,858
South Dakota.....	27,561,000	435,000	27,996,000	29,592	434	30,026

TABLE 8.—Quantity and value of national-forest timber sold, fiscal year 1934—Continued

State	Quantity cut			Value		
	Commer- cial sales	Cost sales	Total	Commer- cial sales	Cost sales	Total
	<i>Board feet</i>	<i>Board feet</i>	<i>Board feet</i>	<i>Dollars</i>	<i>Dollars</i>	<i>Dollars</i>
Tennessee.....	5,313,000		5,313,000	9,901		9,901
Utah.....	5,917,000	2,421,000	8,338,000	11,643	2,500	14,143
Vermont.....	1,545,000		1,545,000	7,963		7,963
Virginia.....	10,065,000		10,065,000	7,921		7,921
Washington.....	60,326,000	208,000	60,534,000	98,099	159	98,258
West Virginia.....	205,000		205,000	420		420
Wisconsin.....	2,073,000		2,073,000	2,470		2,470
Wyoming.....	32,991,000	1,088,000	34,079,000	81,815	1,057	82,872
Total, 1934.....	441,828,000	20,261,000	462,089,000	1,061,686	18,227	¹ 1,079,913
Total, 1933.....	² 338,269,000	² 18,524,000	² 356,793,000	658,115	15,692	¹ 673,807

¹ In addition, minor products not convertible into board feet were sold, valued at \$29,583 in 1934 and \$24,324 (corrected figure) in 1933.

² Corrected figures, varying somewhat from those published in the 1933 report.

PLANTING

During the calendar year 1933, 69,215 acres were planted on the national forests. This was more than two and one-half times the acreage of any previous year and represents the planting of approximately 70,000,000 trees. The increase was made possible by the availability of the C. C. C. and allotments from the P. W. A. appropriation. For planting stock it became necessary to purchase considerable amounts from private nurseries. Steps were taken to increase Forest Service nursery capacity by the enlargement of some of the existing nurseries and the establishment of three new nurseries—one at Manistee, Mich., which has been sown for a production of 25,000,000 trees; one at Manistique, Mich., sown for a production of 18,000,000 trees; and one near Alexandria, La., sown for a production of 10,000,000 trees. The entire production available during the calendar year 1934 from Forest Service nurseries is estimated to be 100,000,000 trees, which will plant approximately 100,000 acres, as against 2,000,000 acres in need of planting. The work can be economically and effectively done only through a carefully planned program. To produce properly conditioned stock requires from 1 to 3 years, and unless planting funds are assured, the stock grown may be wasted. The increase in planting was largely concentrated in the Lake States, where approximately 49,000 acres were covered—36,000 acres more than in 1932.

The area planted on national forests during the calendar year 1933 is shown, by States, in table 9.

TABLE 9.—Planting on national forests, by States, calendar year 1933

State	Area planted	State	Area planted	State	Area planted
	<i>Acres</i>		<i>Acres</i>		<i>Acres</i>
Arkansas.....	1,312.3	Nebraska.....	742.4	Washington.....	3,786.0
California.....	869.8	New Hampshire.....	6.8	West Virginia.....	1,789.6
Colorado.....	1,775.40	North Carolina.....	16.5	Wisconsin.....	15,282.8
Idaho.....	6,301.0	Oklahoma.....	2.0	Wyoming.....	174.5
Michigan.....	23,857.77	Oregon.....	120.0		
Minnesota.....	9,843.0	Pennsylvania.....	2,134.3	Total.....	69,215.17
Montana.....	1,097.0	Virginia.....	104.0		

RANGE

Virtually everywhere in the West the 1933 grazing season was one of subnormal moisture conditions and forage production. On the national-forest ranges there was an average deficiency in both of about 30 percent. In

Montana and northern Idaho forage production was about 20 percent below normal, with a late spring and short growing period and with especially dry conditions east of the Continental Divide. Heavy early winter precipitation, however, afforded relief and lightened winter-feeding costs in this region.

Colorado suffered the third consecutive year of drought, and most of the national forests in Wyoming the fourth or fifth. In southeastern Wyoming and the Black Hills of South Dakota severe grasshopper infestations were added to drought. Plans for emergency treatment of that situation in 1934 were made in cooperation with the Bureau of Entomology, the States, and local settlers. The moisture and forage deficiencies in the central Rocky Mountain region, as in Montana, were most pronounced east of the Continental Divide.

In Arizona and New Mexico spring conditions were generally favorable except for occasional adverse weather in lambing time, which reduced the lamb crop. Calf crops were good. Summer precipitation was light and spotted, followed by a good fall but a less favorable winter.

In the intermountain region, comprising Utah, southern Idaho, Nevada, and part of western Wyoming, a generally good early spring was followed by unfavorable midseason and late-summer conditions. A drought period has persisted in this region for from 5 to 12 years. California had a cold spring, and national-forest moisture conditions for the season were about 70 percent of normal, with areas as low as 50 percent, resulting in about two-thirds the normal volume of forage. The Washington and Oregon national forests have had 7 years of subnormal precipitation. East of the Cascade Mountains the 1933 season after midsummer was especially dry. In December a severe cold spell caused heavy damage to alfalfa fields, but was followed by very beneficial heavy, warm, early winter rains which produced early feed, cheapened hay, and reduced materially winter feed bills.

At the close of the grazing season lambs and cattle were underweight in the intermountain region and in localized sections elsewhere, but as a rule livestock left the ranges in good flesh. Mountain feed in drier seasons usually makes up in part for the reduced quantity by higher value for conditioning the more mature range stock. Nevertheless, the cumulative effect of a succession of drought years upon most of the western national-forest ranges is raising really serious management problems in many places. Arrested improvement or lowered capacity is general. This has focused new attention on capacity in subnormal years, on the importance of herbaceous growth as soil-protective cover, and on the allowances necessary for game and other uses.

The first consideration must be to assure sustained or improved cover and yields. Some downward revisions in grazing-capacity figures have been necessitated, and more may be. Improved management of the ranges in many instances has not been able to offset the effects of the drought. Nevertheless, the ranges generally have been kept in good productive condition. The exceptions are areas that were in bad shape to start with; adverse seasonal conditions tend to show up and aggravate the sore spots.

The policy has been to render all reasonable assistance to a distressed industry by installing control facilities in the form of fences, water developments, and the like and by improving, with the cooperation of the permittees, the management and distribution of livestock on the ranges. These measures have been important offsets to subnormal forage production. But with a consistent demand for summer range on the national forests much in excess of capacity, it is important that their limitations be more definitely recognized both by the public generally and by the present and prospective range permittees.

Emergency-relief activities have drawn heavily on the supervisory time available for range administration. It is gratifying to record that some of the range permittees are assuming more personal field responsibility in matters of progressive range management. To insure the husbandry and improvement of the national-forest pastures is patently in the permanent interest of the dependent livestock permittees themselves.

A still lower cattle market than in 1932 resulted in abnormal hold-overs. Sheep, lamb, and wool prices rose decidedly but without changing much the demand for sheep range. The almost universally open and mild winter of 1933-34 very fortunately reduced wintering expenses for western stockmen

generally, who in 1931-32 had gone through one of the hardest winters ever known and had not fully recovered from its effects.

The modified grazing fee, which is based each year on the average market prices received the previous year for beef cattle and lambs in the 11 Western States, met with general favor and appreciation among national-forest permittees and their creditors. Fees will increase as market prices increase, but a more prosperous industry can and will absorb such increases in good spirit.

The regional agricultural credit agencies rendered an exceptionally prompt, businesslike, and important financing service to national-forest permittees and other western stockmen—a service that will not be forgotten.

RANGE USE

Table 10 shows the grazing use made of the national forests in the calendar year 1933.

TABLE 10.—*Grazing permits issued and numbers of stock allowed under pay permit on the national forests, by States, calendar year 1933*

State	Cattle, horses, and swine				Sheep and goats		
	Permits issued	Stock grazed			Permits issued	Stock grazed	
		Cattle	Horses	Swine		Sheep	Goats
Arizona.....	1,011	191,089	1,339	115	96	291,072	-----
Arkansas.....	43	750	-----	51	1	5	-----
California.....	1,756	138,717	3,883	125	358	367,723	662
Colorado.....	3,016	280,096	2,160	-----	870	945,954	50
Florida.....	24	764	-----	31	-----	-----	-----
Georgia.....	94	349	3	17	5	23	-----
Idaho.....	2,787	125,423	4,569	-----	962	1,313,633	-----
Montana.....	1,858	126,140	6,151	-----	429	585,598	100
Nebraska.....	31	11,667	407	-----	-----	-----	-----
Nevada.....	307	51,878	1,823	-----	123	307,820	-----
New Hampshire.....	6	58	2	-----	-----	-----	-----
New Mexico.....	1,862	91,747	1,704	60	288	191,617	10,225
North Carolina.....	67	321	5	112	6	47	-----
Oklahoma.....	47	2,258	-----	-----	-----	-----	-----
Oregon.....	1,130	83,159	1,340	-----	436	612,336	-----
Pennsylvania.....	2	53	-----	-----	-----	-----	-----
South Carolina.....	38	70	-----	-----	2	-----	8
South Dakota.....	634	29,704	1,067	-----	54	30,661	-----
Tennessee.....	67	447	12	-----	1	15	-----
Utah.....	3,764	103,831	3,251	22	1,898	738,776	-----
Virginia.....	97	1,003	3	-----	9	286	-----
Washington.....	418	13,972	309	-----	121	144,974	-----
West Virginia.....	46	455	11	-----	57	1,425	-----
Wyoming.....	758	107,587	3,758	-----	278	618,956	-----
Total, 1933.....	19,863	1,366,538	31,797	533	5,994	6,150,921	11,045
Total, 1932.....	20,075	1,361,160	35,105	528	6,157	6,308,500	12,438

In addition to the stock under permits, there were grazed in the six western national-forest regions 61,760 cattle and horses and 8,555 sheep and goats under the regulation authorizing free grazing of not to exceed 10 head of stock used for domestic purposes, or by prospectors, campers, and travelers, or in connection with permitted operations on the national forests.

The total number of permittees fell off 1.4 percent, and the number of sheep allowed to graze under permit 2.5 percent; but the number of cattle was 0.4 percent greater than in 1932. The national-forest States showing the largest reductions in sheep were Colorado, Montana, Oregon, Wyoming, and New Mexico; Idaho recorded an increase. To some extent the sheep reductions were made by the Government, under its regulatory authority, to protect the range. The cuts made for this purpose curtailed by 25,051 the number of sheep grazed under 55 permits. Four permittees were required to reduce their flocks by a total of 2,910 head to make room for other permittees.

Where circumstances warrant, permittees who have a preference status for range use are granted the privilege of nonuse for a limited period without forfeiting their status. Nonuse requests by preference holders were granted

for 73,581 cattle and horses and 373,819 sheep. This nonuse was largely offset by admitting temporary permittees. Sheep nonuse in 1932 totaled 410,902 head, due in large part to the decimation of herds by the hard winter of 1931-32. These losses could not normally be replaced in a single year. Advantage was taken of the reduced numbers to favor some ranges that were showing the effects of cumulative drought.

The 1934 season will close the first 10-year period. A thorough review of the questions of term permits, distribution and protection, and the general operation of the grazing regulations in view of changed conditions and trends will be made before the next period begins, in 1935.

Table 11 shows the number and percentage of stock allowed to graze under term permits in the calendar year 1933.

TABLE 11.—*Livestock allowed under term or 10-year permits on the western national forests, calendar year 1933*

	Stock under term permits		Percentage of total			Stock under term permits		Percentage of total	
	Cattle and horses	Sheep and goats	Cattle and horses	Sheep and goats		Cattle and horses	Sheep and goats	Cattle and horses	Sheep and goats
	<i>Number</i>	<i>Number</i>	<i>Percent</i>	<i>Percent</i>		<i>Number</i>	<i>Number</i>	<i>Percent</i>	<i>Percent</i>
Region 1.....	58,948	245,354	40	35	Region 5.....	46,222	106,448	31	29
Region 2.....	168,867	645,587	41	48	Region 6.....	22,641	327,208	21	42
Region 3.....	154,534	265,890	51	57	Total, 1933..	720,177	3,840,887	40	62
Region 4.....	268,965	2,250,400	77	89	Total, 1932..	719,552	3,968,618	50	63

RANGE MANAGEMENT

Range-management practices have improved from year to year. A number of factors have contributed to the improvement. Closer supervision on the part of permittees is one of them. Mention has already been made of the increased assumption of responsibility by permittees last year under the stress of emergency demands upon the Forest Service supervisory force. Cooperation with permittees in the development and application of improved management methods ranks high among the factors in better range management. Group cooperation is particularly effective. Stockmen on the national forests are organized in 733 livestock associations, 701 of which have entered into formal cooperation with the Forest Service.

Basic to improved range management are intensive surveys of the grazing resource and the use of the data in management plans. During the year 2,402,848 acres were thus surveyed, bringing the aggregate to 62,576,402 acres. Special unit-management plans have been developed for 3,382 of the 4,191 cattle and horse allotments, and for 4,156 of the 4,946 sheep allotments.

Range improvements were greatly extended in consequence of the C. C. C. activities and the N. R. A. allotments. This work did not get fully under way until after June 30, 1933, and is not, therefore, reflected to any important degree in table 12, which shows only the construction completed at that time. To December 31, 1933, the C. C. C. had constructed on national forests 1,888 miles of stock driveways and 697.6 miles of fences, developed 3,240 springs and wells, built 310 stock bridges and 91 corrals, and gone over 36,405 acres to eradicate poison plants, and 2,716,334 acres to control rodents. During the fiscal year 1934 more range improvements were made than could have been looked for in 10 years at the rate at which funds for prosecuting this work have been provided in the past.

Table 12 shows the range-improvement construction of the fiscal year 1933. Data for the fiscal year 1934 are not yet compiled.

TABLE 12.—*Range improvements constructed on national forests, fiscal year 1933*

Region	Fences		Corrals		Driveways		Bridges		Water develop- ment		Miscel- laneous	Total cost
	Miles	Cost	Num- ber	Cost	Miles	Cost	Num- ber	Cost	Num- ber	Cost	Cost	
1-----	38	\$10,751	2	\$460	7	\$554	2	\$66	55	\$4,931	\$1,128	\$17,890
2-----	91	25,657	3	648	41	2,820	-----	586	46	3,114	3,891	36,716
3-----	364	58,335	11	440	-----	-----	1	3,403	35	5,289	4,581	72,048
4-----	46	21,230	-----	120	1	35	-----	37	137	21,418	5,688	48,528
5-----	28	7,615	6	883	2	911	-----	-----	78	12,101	2,665	24,175
6-----	48	6,943	12	2,016	28	1,620	2	760	165	10,991	5,694	28,024
Total 1933	615	130,531	34	4,567	79	5,940	5	4,852	516	57,844	23,647	227,381
Total 1932	388	99,353	18	2,160	37	3,190	3	387	567	63,293	24,910	193,293

Range improvements have a very direct bearing upon better management, better protection, and better utilization of the forage resource. Permittees are benefited through lessened management costs, reduced losses, and better breeding control. Range improvements that will provide adequate watering facilities, automatically control the movement and direct the foraging of animals, and reduce and eliminate loss factors, although essentially mechanical in their working, are the prerequisites for well-managed ranges and livestock. They are in many cases necessary before improved adequate management plans can be installed. They are equally important for erosion and water control and the protection of soil values.

The livestock losses on the national forests in the calendar year 1933 are shown in table 13. In computing the 1933 money loss an average value of \$30 per head was assigned the cattle, as against \$40 in 1932. Sheep losses were averaged at \$5 per head for both years. Poisonous plants continue to be the leading specific cause of loss among cattle, and predatory animals among sheep. The control of parasites and infectious and contagious diseases both to livestock and of wild life is greatly aided by the excellent cooperative relations between State and Federal sanitary authorities. Any manifestations of new or unusual diseases are promptly investigated and laboratory determinations made on occasion. These means of control and the generally thrifty condition of animals on national-forest ranges have made the sanitary conditions remarkably good.

TABLE 13.—*Livestock losses, 1933*

CATTLE AND HORSES

Region	Poisonous plants		Predatory ani- mals		Disease		Other		Total	
	Num- ber	Value	Num- ber	Value	Num- ber	Value	Num- ber	Value	Num- ber	Value
1-----	317	\$9,510	20	\$600	106	\$3,180	523	\$15,690	966	\$28,980
2-----	2,747	82,410	69	2,070	1,338	40,140	1,700	51,000	5,854	175,620
3-----	583	17,490	835	25,050	804	24,120	2,820	84,600	5,042	151,260
4-----	1,724	51,720	171	5,130	226	6,780	1,422	42,660	3,543	106,290
5-----	399	11,970	65	1,950	165	4,950	1,080	32,400	1,709	51,270
6-----	164	4,920	19	570	79	2,370	449	13,470	711	21,330
Total, 1933..	5,934	178,020	1,179	35,370	2,718	81,540	7,994	239,820	17,825	534,750
Total, 1932..	6,112	244,480	1,123	44,920	2,811	112,440	9,193	367,720	19,239	769,560

SHEEP AND GOATS

Region	Poisonous plants		Predatory ani- mals		Disease		Other		Total	
	Num- ber	Value	Num- ber	Value	Num- ber	Value	Num- ber	Value	Num- ber	Value
1-----	2,900	\$14,500	6,781	\$33,905	1,038	\$5,190	10,982	\$54,910	21,701	\$108,505
2-----	6,218	31,090	11,871	59,355	3,115	15,575	8,401	42,005	29,605	148,025
3-----	1,059	5,295	3,825	19,125	937	4,685	2,512	12,560	8,333	41,665
4-----	9,825	49,125	32,305	161,525	4,026	20,130	19,792	98,960	65,948	329,740
5-----	1,849	9,245	3,956	19,780	442	2,210	6,209	31,045	12,456	62,280
6-----	3,842	19,210	7,671	38,355	3,005	15,025	8,585	42,925	23,103	115,515
Total, 1933..	25,693	128,465	66,409	332,045	12,563	62,815	56,481	282,405	161,146	805,730
Total, 1932..	28,296	141,480	62,574	312,870	14,663	73,315	54,454	272,270	159,987	799,935

RECREATION AND GAME

The national forests offer many of the requisites for outdoor recreation; spaciousness, scenic beauty, favorable climatic conditions, richness of tree growth and other forms of plant life, fish and game, streams and lakes, striking geological formations, and many other natural attractions. An expanding network of roads and trails affords access to this wealth of recreational opportunity. This recreational resource is now a major factor in the economy of hundreds of communities and thousands of separate business enterprises. In a Nation faced with an increase in the leisure time available to its citizens, and with need for providing means of escape from the intensity of urban life and employment in monotonously repetitive occupations, failure fully to realize the recreational potentialities of the national forests would be a social error. In regions where other economic activities rapidly are dwindling, failure to develop those recreational uses would be an economic injustice to the scores of dependent communities. These circumstances create an obligation to recognize recreational use as a major purpose and service of the national forests and to provide suitably for its development.

Under wholly practicable principles of planned use and management, public use of the national forests for recreation is unquestionably compatible with their other purposes and services. Certain adjustments must be made or restrictions imposed in the utilization of timber, forage, water, and land resources, and in recreational uses. These do not entail net sacrifices of public interest or purpose. They are fully compensated by accruing advantages.

In the national forests, recreational use is informal, democratic, and subject only to a minimum of supervision. It is widely diffused throughout the major part of the forest area. Some particular sections of the national forests, it is true, are exceptionally popular and rather heavily used. But in the main, the visiting public extends its occupancy throughout the whole vast extent of the national forests. And aside from brief periods of extreme fire risk when certain areas of exceptional hazard are closed to use, practically the entire system is always open to public use. The millions of people who use the forests come from all parts of the Nation; automobile license tags of a dozen States can be observed on a single public camp ground at one time.

This recreational use embraces every conceivable type of outdoor activity. A single visitor within a single national forest may combine camping, fishing, hunting, berry-picking, botanizing, mountaineering, geological study, hiking, horseback riding, boating, and other pursuits of pleasure or knowledge. The noon-day picknicker may occupy a site not far removed from an artistic and comfortable summer home maintained on national-forest land under permit. Observations of interesting industrial activities, such as logging, grazing, or mining, frequently enhance rather than detract from public interest and enjoyment. In general, the activity is an excellent example of systematic land-use planning based on well-determined priorities and recognized administrative responsibilities.

The primitive areas, of which there are now 68, with an aggregate area of over 10 million acres, are illustrations of the harmonization of recreational use with other major purposes and objectives of national-forest management. Within these areas all of the basic functions of national forests are carried to full fruition, but at the same time the unique inspirational quality created by the absence of roads, communities, industrial developments, and commercial occupancy is safeguarded and preserved for the enjoyment of the visiting public.

The number of visitors to the national forests in the fiscal year 1933 was estimated as 34,672,125, a decline from the calendar year 1932 of more than 1,000,000 persons. The decrease was in the numbers of hotel and resort guests and of motorists who toured or passed through the national forests. The number of summer-home permittees and guests, campers, and picknickers was more than 400,000 greater than in 1932. These are the classes who use the national forests most. Summer-home permittees and guests numbered 552,685; hotel and resort guests, 1,037,096; campers, 2,219,804; picknickers, 4,355,936; motorists, horsemen, hikers, etc., touring primarily to enjoy national-forest scenery, 5,221,622; and motorists passing through national forests en route to distant destinations, 21,284,982. Many of the latter class are attracted to the routes traversing the national forests because of their scenic interest and charm.

With the additional man power made available by the various relief programs, notably the C. C. C., the P. W. A., the C. W. A., and the F. E. R. A., the national-forest public camp-ground system was markedly enlarged and improved. By the close of the year the number of public camp-grounds upon which had been installed at least some of the facilities essential to the protection of public health and property had increased to a total of 2,229. Not only was the number of improved camp grounds increased by 245, but a large number of the previously developed camp grounds were equipped with additional or superior facilities. While these camp grounds add much to the comfort and enjoyment of the national-forest visitors, perhaps their greatest service is to reduce the hazards to public health and property that would prevail if large numbers of persons indiscriminately distributed themselves throughout the forests without adequate facilities for sanitation and control of fire.

Public interest is being increasingly manifested in national-forest wildlife problems. Wildlife is also attracting increased attention as an economic local resource capable of yielding substantial direct and indirect cash returns to isolated settlers, licensed guides, and business enterprises.

There are fully 60,000 miles of fishing streams in the national forests, and many thousand miles more of these streams beyond the forest boundaries. There are also thousands of natural lakes and artificial bodies of water stocked with fish or suitable for fish production. Still more important is the use of the national forests as summer ranges for herbivorous game species.

The major problem with respect to game has to do with adequate winter feed. At least 60 percent of the big-game winter ranges lie outside the forest boundaries, on the public domain and private lands. Many forests have practically no winter ranges. Approximately 12,000,000 acres of the public domain are actual or potential winter game range. Strategic winter ranges within the national forests are being given special consideration as the need arises or is anticipated in given localities. The national-forest summer ranges afford room for several times the present number of big-game animals without curtailment of the domestic livestock. Game must be studied in relation to its year-long requirements and by localities, because each locality presents its own problem.

Domestic stock and wildlife conflicts have been emphasized by individuals and groups especially interested in recreational and game uses of the forests. So far agitation has been directed wholly at sheep grazing. Only 20 percent of the national-forest areas, large portions of which are at high altitudes above the principal range of deer and elk, is used by sheep. Sheep ranges on the national forests are in full administrative control and are generally in good condition, despite reports to the contrary. Forty-two percent of the national-forest area is used by cattle, which occupy more of the game range; 38 percent of the national-forest area, much of it excellent game country, furnishing food and protective cover, is not used by either cattle or sheep. Game also occupies large areas in common with domestic stock. Large areas are in State and Federal game refuges—25,245,600 acres. Other strategic areas, totaling 3,729,600 acres, are especially segregated and protected in the interests of wildlife. The objective in range use is balanced conservation and use of all the resources involved, in the best public interest. Conditions and trends must be carefully and properly appraised. Through correlation and the meeting of minds, it should be possible to develop intelligent and acceptable programs of administration which will accord wildlife its proper place in forest use.

Table 14 shows the estimated number of big-game animals on the national forests at the close of the calendar year 1933, in comparison with the 1932 number. Since 1921 (the first year in which fairly trustworthy data were obtained) the estimates indicate that the number of antelope has increased 504 percent, black and brown bear 26 percent, deer 107 percent, elk 119 percent, moose 121 percent, and mountain goats 102 percent; but grizzly bears show a decrease of 7 percent, and mountain sheep of 12 percent.

TABLE 14.—*Number of big-game animals on national forests, by States, estimated as of Dec. 31, 1933*

State	Antelope	Bear		Deer	Elk	Moose	Mountain goats	Mountain sheep
		Black or brown	Grizzly					
Alabama.....				750				
Alaska.....		6,200	¹ 4,500	42,500	25	520	8,300	1,525
Arizona.....	6,256	627	8	93,330	4,120			205
Arkansas.....		8		2,500				
California.....	1,730	12,787		250,925	152			449
Colorado.....	97	3,012	6	48,840	13,775	1		3,189
Florida.....		127		3,905				
Georgia.....		15		400				
Idaho.....	3,322	5,063	75	57,510	9,742	466	3,109	1,691
Louisiana.....				250				
Maine.....		50		300		4		
Michigan.....		225		6,155	4	4		
Minnesota.....		1,490		11,845	24	2,735		
Mississippi.....				100				
Montana.....	856	5,758	465	48,430	20,230	1,924	4,181	1,742
Nebraska.....				130				
Nevada.....	205			9,265	45			146
New Hampshire.....		525		3,390				
New Mexico.....	1,062	1,155	9	104,850	1,250			104
North Carolina.....		358		6,305	20			
Oklahoma.....		4		500	325			
Oregon.....	345	6,240	1	81,675	13,230			50
Pennsylvania.....		200		13,500				
South Carolina.....				775				
South Dakota.....				6,380	310		12	
Tennessee.....		28		252				
Utah.....	40	568	4	74,750	3,215			151
Vermont.....		50		500				
Virginia.....		354		190	50			
Washington.....		8,335	8	35,285	9,265		4,581	18
West Virginia.....		875		2,760				
Wisconsin.....		67		7,900				
Wyoming.....	545	1,719	145	22,185	39,415	2,430		2,880
Total, 1933.....	14,458	55,840	5,221	938,332	115,197	8,084	20,183	12,150
Total, 1932.....	13,150	52,331	5,164	946,546	103,856	7,854	21,736	12,505

¹ Includes Alaska brown bears.

WATER POWER

The effect of the depression on water-power development, noted in previous reports, continued strongly in evidence. The number of new applications to the Federal Power Commission involving the use of national-forest land has fallen off greatly. While construction work is being prosecuted on projects initiated before the slump in the power market, the principal activities of the Forest Service in assisting the Federal Power Commission have been the supervision of operations of permittees and licensees; valuation, accounting, and appraisal work; inspections of the construction and maintenance of dams; and investigations and reports on applications for amendment of permits and licenses.

At the close of the fiscal year, the Forest Service, acting for the Federal Power Commission, was supervising the operation of 379 permittees or licensees under the Federal Water Power Act. This was an increase of 8 over the number the preceding year. During the year the Commission requested the Forest Service to make 42 investigations and reports. The total number of individual reports made by the Forest Service was 48. It also made 1 valuation and appraisal. During the year 23 applications for permit or license involving the use of national-forest land were received. The total applications to the Commission was 33. As in previous years, the number of cases involving forest land decidedly exceeded the number involving land located elsewhere.

Toward the close of the year it was possible to make a good start in the California region on the power inventory and valuation and on the investigation of the power value of land under power withdrawal or classification. This work is being financed from an allotment to the Forest Service by the Public Works board. Within the time and money available to the Forest Service, it will not be possible to complete all the planned work even in California. But much field work will be done and such of the computations, records, reports, valuations for power and other uses, etc., as is not done from the P. W. A. money can be carried on from time to time in later years.

At the close of the year 208 permits issued by the Department of Agriculture (prior to the passage of the Federal Water Power Act) were outstanding. This was 2 less than a year earlier. The number comprised 98 permits and easements for water-power projects, with an average low-flow output estimated as 516,126 horsepower, and 110 for transmission lines only, with a total length of 897.26 miles within the national-forest boundaries. An annual rental is required for 52 of the power projects, with an estimated output of 491,016 horsepower, and for 87 of the transmission lines, with a length of 729.83 miles within the forest boundaries. The 46 power projects under free permits had an estimated average output of 25,110 horsepower, and the 23 transmission lines under free permits had a length of 167.43 miles within the forests.

ROADS AND TRAILS

Table 15 shows the present status of the transportation system planned for the national forests. The forest highways are roads required primarily for public travel, while the forest-development roads and trails are primarily for the protection, administration, development, and utilization of the forests. Tables 16, 17, and 18 show by States the miles constructed and maintained and the expenditures and apportionments of the various road funds; and table 19 shows the condition of these funds at the close of the fiscal year.

TABLE 15.—*Classification of mileage in forest road and trail system and expenditure required to complete the system to a satisfactory standard, June 30, 1934*

Class	Total	Satisfactory standard	Unsatisfactory standard	Non-existing	Expenditure required to complete
	<i>Miles</i>	<i>Miles</i>	<i>Miles</i>	<i>Miles</i>	<i>Dollars</i>
Forest highways.....	17,926	7,924	8,743	1,259	156,323,800
Forest development roads.....	86,023	36,532	21,851	27,640	53,279,400
Total.....	103,949	44,456	30,594	28,899	209,603,200
Trails.....	150,788	122,178	13,116	15,494	3,366,200
Total.....					212,969,400

TABLE 16.—Construction, improvement, and maintenance of roads and trails from forest-road appropriations and other Federal and cooperative funds, by States, June 30, 1934

State	Fiscal year 1934				Total to June 30, 1934		Expenditures to June 30, 1934		
	Miles constructed		Miles maintained		Miles constructed		Federal funds	Cooperative funds	Total funds
	Roads	Trails	Roads	Trails	Roads	Trails			
Ala.	45.9	-----	182.8	-----	117.3	-----	\$537,636.32	\$25,278.16	\$562,914.48
Alaska	8.2	182.9	239.4	564.5	260.6	770.1	7,354,146.86	329,262.27	7,683,409.13
Ariz.	520.8	144.5	3,985.1	2,699.0	2,984.1	2,069.1	10,826,316.50	1,158,087.95	11,984,404.45
Ark.	450.9	-----	1,111.0	923.0	1,167.9	571.4	3,233,974.59	135,929.75	3,369,904.34
Calif.	2,651.5	370.5	13,857.2	21,056.9	8,081.6	11,894.2	33,425,979.87	8,612,252.47	42,038,232.34
Colo.	158.7	118.4	1,229.2	10,355.2	1,798.4	11,888.9	11,314,473.26	1,082,295.13	12,396,768.39
Fla.	412.5	-----	376.0	-----	1,029.2	-----	1,138,570.12	146,179.84	1,284,749.96
Ga.	149.8	8.0	148.3	351.9	313.9	359.9	1,376,903.42	82,949.62	1,459,853.04
Idaho.	1,073.3	323.5	4,442.8	25,046.0	4,454.2	20,711.6	25,408,712.87	1,898,002.49	27,306,715.36
Ill.	50.2	-----	22.0	-----	50.2	-----	297,153.27	-----	297,153.27
Kans.	-----	-----	-----	-----	3.4	-----	2,111.51	-----	2,111.51
Ky.	56.0	-----	16.2	-----	56.0	-----	354,318.98	-----	354,318.98
La.	156.6	-----	153.9	-----	310.5	-----	189,976.09	-----	189,976.09
Maine	9.5	19.3	10.4	74.0	19.9	86.5	129,011.13	-----	129,011.13
Md.	-----	-----	-----	-----	-----	-----	70.05	-----	70.05
Mich.	528.2	-----	1,103.3	-----	1,154.6	-----	816,639.52	91,180.97	907,820.49
Minn.	187.3	28.1	312.4	163.9	701.0	613.7	1,607,418.27	291,478.99	1,898,897.26
Miss.	749.6	-----	-----	-----	758.6	-----	600,867.51	-----	600,867.51
Mo.	191.0	-----	50.0	-----	191.0	-----	628,219.14	-----	628,219.14
Mont.	480.8	62.1	3,300.2	21,031.0	1,819.9	19,473.1	14,568,716.36	659,505.24	15,228,221.60
Nebr.	18.7	-----	78.0	-----	70.2	-----	147,866.89	990.80	148,857.69
Nev.	59.4	17.0	374.0	1,322.0	621.1	937.4	2,535,606.55	175,636.09	2,711,242.64
N. H.	26.2	107.2	308.5	580.0	97.8	687.2	903,384.85	95,949.70	999,334.55
N. J.	-----	-----	-----	-----	-----	-----	217.71	-----	217.71
N. Mex.	411.7	49.0	2,305.3	3,270.8	1,773.2	1,683.8	8,146,671.27	332,357.17	8,479,028.44
N. Y.	-----	-----	-----	-----	-----	-----	81.32	-----	81.32
N. C.	144.6	23.3	347.2	684.3	385.3	700.1	1,978,962.84	467,333.49	2,446,296.33
N. Dak.	-----	-----	-----	-----	1.0	-----	57.75	-----	57.75
Okla.	47.5	-----	61.2	1.5	98.9	16.5	227,606.42	15,847.08	243,453.50
Oreg.	1,443.2	348.9	10,164.1	15,552.0	6,199.7	9,051.8	24,092,088.92	8,185,542.74	32,277,631.66
Pa.	69.4	21.0	192.1	201.8	141.4	222.8	1,190,880.20	42,185.50	1,233,065.70
P. R.	.9	1.5	-----	36.3	7.5	37.8	220,798.32	550.00	221,348.32
S. C.	67.9	-----	45.2	18.2	74.2	18.2	249,565.48	15,659.81	265,225.29
S. Dak.	46.6	-----	275.7	40.5	401.9	85.1	1,452,545.77	244,046.11	1,696,591.88
Tenn.	194.3	100.0	249.6	552.8	328.6	917.8	1,467,963.39	189,884.30	1,657,847.69
Tex.	-----	-----	-----	-----	-----	-----	1.08	-----	1.08
Utah	417.4	149.9	1,577.9	5,093.8	1,742.1	3,875.3	6,296,498.47	995,717.33	7,292,215.80
Vt.	5.2	13.2	3.5	25.3	7.2	13.2	102,086.01	-----	102,086.01
Va.	177.9	35.0	328.0	917.3	421.0	962.4	1,847,263.36	106,400.35	1,953,663.71
Wash.	802.1	277.3	3,222.2	14,594.0	2,583.8	8,932.4	15,606,584.67	1,727,633.42	17,334,218.09
W. Va.	173.2	45.0	203.0	202.0	374.8	605.2	1,138,094.54	38,159.30	1,176,253.84
Wis.	419.5	-----	453.0	-----	597.7	-----	490,434.69	1,820.00	492,254.69
Wyo.	123.6	79.0	996.4	6,024.2	1,242.8	2,620.3	7,104,430.88	399,944.98	7,504,375.86
Total.....	12,530.1	2,524.6	51,725.1	131,382.2	42,442.5	99,805.8	189,010,907.02	27,540,061.05	216,558,968.07

TABLE 17.—*Distribution among the States of the road and trail apportionments for the fiscal year 1935*

State	10 percent fund	Emergency construction forest highways	Forest-road development	Total
Alabama.....	\$18. 01	\$6, 292	\$8, 294	\$14, 604. 01
Alaska.....	4, 771. 43	671, 067	20, 160	695, 998. 43
Arizona.....	22, 000. 24	422, 607	133, 416	578, 023. 24
Arkansas.....	12, 361. 94	76, 504	61, 462	150, 327. 94
California.....	52, 518. 43	1, 025, 151	578, 314	1, 655, 983. 43
Colorado.....	38, 767. 01	531, 025	125, 812	695, 604. 01
Florida.....	2, 038. 14	32, 975	18, 165	53, 178. 14
Georgia.....	868. 76	15, 820	17, 418	34, 106. 76
Idaho.....	32, 799. 35	740, 576	483, 508	1, 256, 883. 35
Illinois.....	.....	2, 051	5, 151	7, 202. 00
Kentucky.....	.....	4, 128	11, 530	15, 658. 00
Louisiana.....	31. 05	11, 014	7, 189	18, 234. 05
Maine.....	175. 27	2, 289	1, 106	3, 570. 27
Michigan.....	1, 143. 44	35, 523	97, 472	134, 138. 44
Minnesota.....	919. 48	68, 175	44, 100	113, 194. 48
Mississippi.....	38. 87	19, 799	6, 912	26, 749. 87
Missouri.....	.....	9, 749	20, 203	29, 952. 00
Montana.....	16, 890. 67	580, 574	237, 314	834, 778. 67
Nebraska.....	498. 23	6, 975	5, 763	13, 236. 28
Nevada.....	7, 571. 88	132, 492	13, 904	153, 967. 88
New Hampshire.....	2, 597. 98	36, 784	14, 375	53, 756. 98
New Mexico.....	10, 050. 45	297, 117	111, 384	418, 551. 45
North Carolina.....	2, 780. 73	22, 380	23, 224	48, 384. 73
Oklahoma.....	475. 67	5, 858	108, 937	115, 270. 67
Oregon.....	28, 039. 78	967, 688	344, 208	1, 339, 935. 78
Pennsylvania.....	783. 15	15, 004	14, 681	30, 468. 15
Puerto Rico.....	.....	964	830	1, 794. 00
South Carolina.....	236. 55	9, 362	4, 700	14, 298. 55
South Dakota.....	5, 912. 97	56, 954	36, 441	99, 307. 97
Tennessee.....	857. 51	19, 724	21, 289	41, 870. 51
Texas.....	.....	6, 770	3, 000	9, 770. 00
Utah.....	19, 294. 32	243, 870	62, 555	325, 719. 32
Vermont.....	453. 07	4, 147	4, 382	8, 982. 07
Virginia.....	953. 55	25, 858	24, 884	51, 695. 55
Washington.....	45, 411. 29	527, 466	210, 843	783, 720. 29
West Virginia.....	176. 31	20, 635	31, 104	51, 915. 31
Wisconsin.....	58. 11	27, 001	84, 354	111, 413. 11
Wyoming.....	17, 651. 18	317, 632	101, 616	436, 899. 18
Total.....	329, 144. 87	7, 000, 000	3, 100, 000	10, 429, 144. 87

¹ Includes \$100,000 truck trails and trails under National Industrial Recovery Act, fiscal year 1935.

TABLE 18.—*Distribution among the States of the total road and trail apportionments, including the fiscal year 1935*

State	10-percent fund	Section 8	Federal forest-road construction	Forest highways ¹	Forest road development ²	Improvement ³	Total
Alabama-----	\$1,045.91	\$15,456.04	\$1,922.31	\$80,798	141,478	\$31,077.06	\$271,777.32
Alaska-----	175,580.88	470,963.60	203,229.50	7,316,251	329,274	-----	8,495,298.98
Arizona-----	701,493.80	677,956.45	490,434.11	6,227,179	2,141,787	546,273.39	10,785,123.75
Arkansas-----	144,427.33	175,126.19	128,423.38	939,822	904,998	295,597.47	2,588,694.37
California-----	1,785,673.34	1,464,333.82	1,201,431.20	15,005,860	7,734,879	1,518,217.76	28,710,395.12
Colorado-----	849,662.25	770,948.34	784,259.55	7,393,963	2,365,045	197,297.57	12,361,175.71
Florida-----	48,092.00	119,528.14	21,534.94	326,597	209,000	140,417.47	865,169.55
Georgia-----	13,900.76	52,393.57	130,443.73	210,073	324,927	133,229.53	864,967.59
Idaho-----	1,046,898.88	1,176,750.85	1,337,004.17	11,059,164	9,237,490	1,827,886.55	25,685,194.45
Illinois-----	-----	-----	-----	22,283	5,547	-----	27,830.00
Kansas-----	1,867.27	-----	-----	-----	-----	-----	1,867.27
Kentucky-----	722.72	-----	-----	28,819	133,980	-----	163,521.72
Louisiana-----	88.67	-----	-----	42,104	65,946	38,132.47	146,271.14
Maine-----	4,155.30	32.41	3,738.77	30,621	37,972	21,909.56	98,429.04
Maryland-----	70.05	-----	-----	-----	-----	-----	70.05
Michigan-----	5,454.16	115.63	3,000.00	227,402	388,116	164,507.86	788,595.65
Minnesota-----	45,933.13	8,036.36	108,352.03	737,696	568,248	130,348.59	1,598,614.11
Mississippi-----	38.87	-----	-----	60,075	103,399	8,598.45	172,111.32
Missouri-----	-----	-----	-----	31,237	20,203	-----	51,440.00
Montana-----	643,433.03	762,523.77	764,035.26	8,749,984	4,400,122	651,377.24	15,971,475.30
Nebraska-----	21,321.21	18.98	-----	105,475	50,898	578.27	178,291.46
Nevada-----	197,080.54	192,989.88	81,491.85	2,051,257	193,247	45,878.18	2,761,944.45
New Hampshire-----	55,819.57	7,165.35	10,941.30	453,247	259,746	56,487.05	843,406.27
New Jersey-----	118.99	-----	-----	-----	83	-----	201.99
New Mexico-----	380,007.46	426,086.04	518,426.97	4,497,653	1,688,833	408,824.28	7,919,830.75
New York-----	4.00	-----	-----	-----	20	-----	24.00
North Carolina-----	43,773.92	86,336.41	176,466.28	333,485	713,483	192,530.92	1,546,075.53
North Dakota-----	45.75	7.00	-----	-----	-----	-----	52.75
Oklahoma-----	11,639.42	65.49	2,775.17	68,243	182,642	35,700.19	301,065.27
Oregon-----	1,099,437.22	1,428,785.95	1,013,981.59	13,547,726	6,681,700	876,916.07	24,648,546.83
Pennsylvania-----	6,672.47	7,724.04	21.42	161,043	232,826	79,976.40	488,263.33
Puerto Rico-----	150.44	7.00	3,303.09	12,805	28,835	4,714.52	49,855.05
South Carolina-----	3,490.23	402.10	48,028.61	54,947	78,666	171.08	185,705.02
South Dakota-----	198,939.16	87,106.45	78,652.52	827,447	334,754	33,879.18	1,560,778.31
Tennessee-----	21,978.10	106,854.56	27,967.79	272,079	381,206	100,304.31	910,389.76
Texas-----	-----	-----	-----	21,095	3,000	-----	24,095.00
Utah-----	454,470.67	464,918.34	512,489.56	3,668,451	1,071,943	183,090.76	6,355,363.33
Vermont-----	487.47	-----	-----	17,887	54,211	10,778.15	63,863.62
Virginia-----	49,119.31	58,390.16	71,784.26	355,446	460,681	154,268.85	1,149,689.58
Washington-----	749,725.04	958,090.33	732,302.49	7,510,278	4,931,063	862,891.32	15,744,350.18
West Virginia-----	6,507.75	12,830.41	5,049.24	168,870	351,883	208,604.94	753,745.34
Wisconsin-----	121.36	-----	-----	110,494	223,108	98,415.88	432,139.24
Wyoming-----	497,621.74	468,056.34	538,468.91	4,772,144	1,564,761	102,815.87	7,943,867.86
Total-----	9,267,070.17	10,000,000.00	9,000,000.00	97,500,000	48,600,000	9,161,997.19	183,529,067.36

¹ Includes \$3,000,000 appropriated for emergency highways within national forests, fiscal year 1931; \$5,000,000 emergency forest highways, fiscal year 1933; and \$15,000,000 for forest highways under the provisions of section 205 of the National Industrial Act.

² Includes \$10,000,000 truck trails and trails appropriated under the provisions of section 205 of the National Industrial Act, fiscal year 1934, and \$100,000 fiscal year 1935.

³ Includes actual road and trail expenditures made from annual funds.

TABLE 19.—*Condition of forest-road funds on June 30, 1934*

Fund	Appropriations	Expenditures	Balance
Ten-percent-----	\$8,937,925.30	\$8,346,902.14	\$591,023.16
Section 8-----	10,000,000.00	10,000,000.00	-----
Federal forest-road construction-----	9,000,000.00	9,000,000.00	-----
Forest highways ¹ -----	73,417,400.00	72,829,759.03	587,640.97
Forest highways—N. R. A-----	15,000,000.00	5,199,660.56	9,800,339.44
Forest-road development-----	35,500,000.00	34,906,938.09	593,061.91
Forest-road development—N. R. A-----	10,000,000.00	5,261,904.34	3,738,075.14
Improvement ¹ -----	9,161,997.19	9,161,924.86	-----
Total-----	171,017,322.49	155,707,181.87	15,310,140.62

¹ Includes emergency funds.

The Agricultural Appropriation Act for the fiscal year 1935 made available only \$1,500,000 of the \$2,082,600 unappropriated portion of the 1933 \$12,500,000 authorization, leaving a balance of \$582,600 of the regular forest-highway authorization subject to later appropriation. The expenditure on forest highways in Alaska was again limited to \$350,000, as in the two immediately preceding agricultural appropriation acts. The Hayden-Cartwright Act authorized the appropriation of \$10,000,000 for each of the fiscal years 1936 and 1937, for forest highways and forest-development roads under the provisions of section 23 of the Federal Highway Act; and the Deficiency Act of June 19, 1934, appropriated \$10,000,000 for 1935, thus making available \$7,000,000 for forest highways and \$3,000,000 for forest-development roads and trails. These amounts will be apportioned to the national-forest States on the same basis as the regular forest-highway and forest-road-development funds.

At the close of the year the \$15,000,000 allotted for forest highways under the National Industrial Recovery Act, as specified in last year's report, was practically all under contract, and about 72 percent of the \$10,000,000 allotted for national-forest roads, trails, bridges, and related projects had been expended or obligated.

MAPS AND SURVEYS

The Forest Service compiled, traced, and had published for official use 17 quarter-inch scale maps, 17 half-inch scale maps, and three 1-inch scale maps of individual national forests. There were also prepared and published 5 maps to accompany Presidential Executive orders, and 3 United States Geological Survey quadrangles showing in color tints the vegetative types and listing the various species. Small editions of 37 miscellaneous small maps, charts, tables, graphs, and illustrations were issued.

Scattered areas totaling approximately 2,300 square miles of the national forests in Western States were mapped to the accuracy and scale required for forest administration.

RESEARCH

The funds made available for research activities during the fiscal year 1934, under various appropriation items and through executive allotments, are shown in table 20, in comparison with the amounts appropriated for 1933 and appropriated and allotted for 1935.

TABLE 20.—*Appropriations and allotments of Federal funds for research, 1933-35*

Class of research	1933 ¹	1934			1935		
		Appropriated ¹	Allotted ²	Total	Appropriated	Allotted	Total
Forest management.....	\$497, 181	\$386, 095	\$72, 426	\$458, 521	\$392, 810	\$168, 084	\$560, 894
Range investigations.....	111, 922	78, 386	47, 367	125, 753	81, 025	95, 692	176, 717
Forest products.....	556, 425	444, 376	-----	444, 376	459, 725	150, 000	609, 725
Forest survey.....	157, 221	125, 205	275, 749	400, 954	³ 118, 543	615, 810	734, 353
Forest economics.....	64, 692	47, 126	15, 566	62, 692	48, 493	20, 164	68, 657
Erosion and stream flow.....	82, 973	65, 341	40, 535	105, 876	³ 67, 642	182, 362	250, 004
Forest taxation.....	38, 023	27, 713	-----	27, 713	30, 700	-----	30, 700
Forest insurance.....	12, 000	8, 046	-----	8, 046	14, 300	-----	14, 300

¹ Amounts made available by the Agricultural Appropriations Act less the amounts withheld under the provisions of the Economy Act and by the Bureau of the Budget.

² Amounts made available through allotments from emergency appropriations.

³ Allocated from National Industrial Recovery Act funds in lieu of regular appropriations. See p. 12.

The amounts shown as appropriated for the fiscal year 1934 are somewhat greater than the showing in last year's report, as a result of the law restoring two-thirds of the salary cut made by the Economy Act.

FOREST ECONOMICS

Dependable data in the field of forest economics are essential for economic and social planning. The primary purpose of the forest-economic investigations pursued during the year has been to obtain and interpret data needed and called for by public administrators, economists, and industrialists.

An example is the study of tax delinquency. That this is wide-spread throughout forested and cut-over regions is well known, but its underlying causes, its actual extent, and its probable future trends have been matters of speculation. Accurate knowledge of the character and amount of forest land that is being abandoned and of the reasons for its abandonment is essential for the proper shaping of public policy. The study of this subject was continued in the Lake States, the South, and the Pacific Northwest.

In the last-named region tax-delinquent and reverted forest areas in 18 representative counties have been listed and mapped, and in several of these counties data have been gathered on trends in values, values by property classes, taxes levied, taxes uncollected, population, public debt, and the intent of forest-land owners. In the forest section of western Washington and Oregon more than 6,000,000 acres were found to be tax-delinquent. Before the findings of the study were completed, large and effective use of the data gathered was made by county courts, tax agencies, and several research agencies; many miscellaneous requests for statistical and map data were filled; some of the facts developed were reported at conferences and in public addresses; and regional interest in the abandoned forest-land problem broadened perceptibly. Washington State College, the University of Washington, and Oregon State College made use of the results of the study in connection with allied projects of their own.

In the South, the tax-delinquency study in Arkansas was virtually completed, and a report is being prepared for publication. Similar studies are under way in Mississippi, Louisiana, and Georgia. The basic data compiled in these studies are in great demand by State and Federal agencies, universities, and others. In the Lake States, four counties in upper Michigan were intensively studied and a bulletin was prepared for publication.

Partly as a result of the time and cost studies reported in 1933, logging methods in the Douglas fir region are undergoing rapid change. Studies of further adaptation of logging methods to sound timber-management requirements were continued. A report on timber management is virtually completed dealing with the most effective methods of placing forest properties on a sustained-yield basis by the use of this new logging technique. The results of a detailed time and cost study made in a typical ponderosa pine logging operation in western Montana were analyzed and made available to the industry, and a report was completed for publication. The study indicates that clean-cutting is seldom the most profitable method, and that if the method of economic selection is substituted the production of select grades of pine lumber may be increased by as much as one-third. These studies contribute directly to the development of practical methods of carrying out the conservation provisions of the lumber code.

The forest-insurance study was completed for the sugar pine, ponderosa pine, and redwood regions of California. The essential conclusion is that the extent and character of the losses set up no real reason why forest-fire insurance should not be able to operate successfully in these regions.

Records of 1933 stumpage and log prices in all forest regions were urgently requested by the Lumber Code Authority and were compiled and prepared for publication.

FOREST SURVEY

An unprecedented demand for the detailed information that is being gathered by the Forest Survey has come both from regions where dependable data could be furnished and from regions in which it has not yet been possible to initiate work. The survey has had to be planned and conducted as a Nation-wide undertaking, to be prosecuted first where related problems were most acute. Emergency funds have speeded up the work both in the field and the office, and have enabled much-needed data to be obtained and released far more promptly than the curtailed regular appropriation would have permitted. A difficult problem of the rapid expansion of the work has been the enlisting and training of the highly specialized and technical personnel necessary.

In the Pacific Northwest, the preliminary inventory data gathered in the Douglas fir region were compiled by counties and for each State as a whole, and released in mimeographed form. The depletion phase of the survey was completed; and the growth phase is well under way. Generalized type maps for the entire region were completed. Field work was commenced in the ponderosa pine region of eastern Oregon.

In the South, the inventory was completed on nearly 33,000,000 acres, including portions of the bottom land hardwood region of the Mississippi River, the shortleaf-loblolly pine region of Mississippi, the longleaf-slash pine belt of Florida, Georgia, and South Carolina, and the upland hardwoods area of Mississippi. At the request of the Tennessee Valley Authority, the survey was extended to the watersheds of the Clinch and Powell Rivers, above the Norris Dam. Office compilation and analysis work are proceeding rapidly.

In the Lake States, 20,000,000 acres in Minnesota were surveyed, and office computational work was started; and office compilations were completed for two counties in Michigan, on which field work had been done previously. In the "Inland Empire" inventory field work is under way on 10,000,000 acres, and timber estimates were collected on an additional 500,000 acres. In California, cover-type maps of approximately 4,650,000 acres, in eight additional counties, were prepared for publication.

The major effort on the requirements phase has been devoted to rural construction. A detailed canvass was made of 15 carefully selected sample counties throughout the country. A very close relationship between soil classification, types of farming, and farm buildings is evident. Studies of lumber requirements for urban construction, particularly housing, were continued.

A study of lumber used by secondary wood-using industries in 1933 was begun, in response to a request from the Lumber Code Authority.

FOREST TAXATION

A formal report of the Forest Taxation Inquiry is complete and ready for publication. A preliminary announcement of the principal conclusions and recommendations was distributed. Several States have requested assistance in applying the recommendations of the inquiry, and it is planned to carry on local application studies of this character.

FOREST-MANAGEMENT INVESTIGATIONS

Emergency activities created new outlets for forest-management research data, to meet varied requirements. One of the outstanding demands grew out of the establishment of the lumber code, under which the lumber industry established a series of rules of forest practice. Separate rules to bring about adequate restocking and protection were set up for each of the major timber-producing regions. These rules were very largely based upon the investigations of many years in virtually every important forest type. Of particular value were those relating to methods of cutting, selective logging, slash disposal, fire control, and growth. Other studies that in the aggregate were heavily drawn upon concerned the distance seed is carried by the wind, the age of seed-bearing trees, the number of seed trees necessary per acre, the number and distribution of trees needed to make a stand, the effect of slash disposal upon reproduction, establishment, and growth, the rate at which understocked forest stands develop, and many more details. The development of a marketing agreement between the turpentine and rosin producers and the Agricultural Adjustment Administration called for information on conservative methods of naval stores practice. Outstanding among the achievements of this agreement is the clause establishing 9 inches as the minimum diameter for chipping and 14 inches as the minimum for two faces. By adopting this clause the naval stores industry has taken its longest step forward in conservation since the coming into use of the Herty cup system.

Other agencies that drew upon the results of silvical research included the Reconstruction Finance Corporation and the Farm Loan Board, in connection with loans on forest properties. The data sought for this purpose concerned growth and potential yields, forest practices, fire-protective measures necessary to maintain the forest, and the like. Protective clauses insuring conservative handling of the forest were included in many of these loans. But probably the

greatest call arose in connection with the activities of the Civilian Conservation Corps. In practically every region, research findings were put into immediate application on large areas of forest. Data were furnished administrative agencies on methods to be used in such stand-improvement measures as the conversion of fire-scarred and defective second-growth into productive stands, releasing reproduction of desirable species overtopped and suppressed by worthless weed trees, poisoning and girdling "wolf" trees, and using toxic chemicals to destroy sprout and chaparral growth. Three publications and many mimeographed articles outlining silvicultural practices were issued to meet the specific needs of the corps.

SILVICAL AND NAVAL STORES RESEARCH

Investigations continue to demonstrate that good silviculture is likely to be good business. In the northern hardwoods, studies of the Lake States Forest Experiment Station showed an annual growth varying from 100 up to 250 board feet per acre, the amount depending upon how heavily the original stand was cut; the best growth was obtained when not more than about 60 percent of the original volume was removed. Selective cutting realized from \$10 to \$20 per thousand feet for stumpage and profit, while the mortality in the stands left was less than 0.5 percent and the fire hazard was far lower than where heavier cutting was practiced. In the redwood region of California, where clear cutting has been the rule, preliminary results show that selective logging with tractors is possible and affords greater returns to the operator.

Work in the western white pine type indicated some of the reasons why pine reproduction is obtained so sporadically. Dormant seed which has lain in the litter and duff for more than 2 years is not viable, so that reproduction from this source cannot be depended upon unless a heavy seed crop occurred within 2 years before the cutting. When seed trees are present enough seedlings appear from time to time to furnish adequate stocking if they live, but a stand is not assured until the seedlings are more than 3 years old. The chief causes of early seedling mortality are drought and high soil-surface temperatures, which in the hottest periods are from 120° to 150°F; and the losses of seedlings are greatest on clear-cut areas and least in half shade.

Attention was given to the relationship between lack of climatic moisture and the distribution of tree species, both natural and through forest planting. Laboratory studies at the Lake States Forest Experiment Station show that jack pine is the most resistant of the native conifers, followed by Norway pine, white pine, and white spruce. Plants grown with either a low or a too-abundant nitrogen supply were found less resistant to drought than well but not too-heavily fertilized plants; those grown in the shade were less drought-resistant than those grown in full sunlight; seedlings seem to be more drought-resistant than transplants with tops of equal size; and plants grown with a normal supply of water are likely to be more drought-resistant than those grown with either a meager or an excessive supply.

Beginning about 1870, there was much tree planting in the prairie region for several decades. In North Dakota most of the plantings were for protection from wind. Recently, with recurring drought, many of the trees have died. A field study showed that much of the loss was due to a poor choice of species, to grazing, and to lack of care. Planting was feasible where the precipitation did not fall below 16 or 18 inches. In North Dakota, the Carolina poplar should not be used, willow can be used only on very moist sites, and boxelder and cottonwood are satisfactory except on the driest sites. Green ash is the most desirable hardwood species, and ponderosa pine, Scotch pine, and Rocky Mountain red cedar are the best conifers. With proper selection of species and sites and with good care, a planted grove should last 65 years or more.

Woodland grazing in the Central States was studied further. In general, it converts forest into open pasture. Surveys throughout Indiana indicate that fully 50 percent of the grazed farm woods have already reached the stage where they are no longer capable of yielding forest products.

In American reforestation enterprises little attention has so far been paid to the source of seed, although it is well recognized abroad that seed source is of real concern in large-scale planting. In 1912, Douglas fir seed was collected in Oregon and Washington from trees of different ages, growing in different localities, on different sites, at different altitudes, and in stands of different density and health. Some 12,000 trees grown from this seed were-

planted in several different localities and at different elevations. The plantations now show that age, quality of site, growing space, and fungus infection of the parent tree had no effect upon the height growth of the progeny. At high elevations stock from seed produced at high elevations made faster growth than stock from seed produced at lower elevations; but when the planting was at low elevations the reverse was true. Two localities furnished trees that were consistently taller in each plantation than the average tree, but no specific characteristic of the parent or site explained this outstanding vigor. Mortality in the plantations was not affected by the seed source, but trees from one locality were injured severely and consistently by frost. In the Lake States, Norway pine trees produced from seed gathered in the southern part of the tree's range, when planted in the northern part, made faster and sturdier growth but were less drought-resistant than trees from seed of northern origin. Trees from northern seed when planted in central Michigan or Wisconsin develop much more slowly than the local stock.

Naval stores work in the Southeast continued to demonstrate the value of conservative working. Conservative chipping adds nothing to the operator's cost but obtains from 20 to 50 percent more gum per face and extends the workable life of the timber. With narrow streaks trees maintained their full gum yields for 8 years.

After 2 years of working, 41 percent of the trees chipped 6 days a week were dry-faced; of those chipped 3 times a week, 30 percent; of those chipped twice a week, 13 percent; of those chipped but once a week, none. Tacking the tin gutters to the tree instead of inserting them deeply in the wood increases the yield of gum from longleaf over a 5-year period by from 15 to 20 percent, and the yield from slash pine by from 15 to 30 percent.

FIRE RESEARCH

In the past few years forest-fire research has contributed substantially to better fire control. Detailed analysis of the records of thousands of fires led up to the development of more systematically planned detection, transportation, and communication. In detection planning the way was shown to better distribution of man power, making it possible to cover a larger area by a given number of look-outs without duplication and with increased efficiency. Transportation planning made possible greater speed of attack. With the aid of emergency funds, plans embodying the principles discovered through fire research were put into practical effect on large areas of national-forest, national-park, State, and other forest lands. The forest experiment stations not only developed the technic for applying the work, but also trained many administrative men detailed for the purpose. In one case 30 men were given special training, and over 1,200 visibility maps were prepared.

Laboratory studies of the effect of background, light intensity, and observation direction indicated that further field studies of visibility were needed. With the aid of members of the C. C. C. 201 carefully controlled forest fires were set and observed, under a wide variety of conditions, by the California Forest Experiment Station. Distance up to 20 miles affected the detection time only slightly. The direction of the sun, relatively to the fire, was an important factor. Suspended particles in the air greatly affected visibility, but fires were detected up to 7 miles away even through the drift smoke from the great Tillamook fire in Oregon. Under the most favorable conditions smoke became visible in about 8 minutes; under moderately poor conditions in 12 minutes. The normal lag between the start of the fire and the rise of the first smoke was about 4 minutes. The rate at which fires spread was an important factor in detection time.

Lightning causes close to half of all fires on the national forests of Oregon and Washington, with an average of 720 annually. They create a difficult suppression problem because they usually occur at inaccessible places and may occur in large numbers on a single day. For 7 years the look-outs in these States have been observing lightning storms, and more than 6,000 reports have been made. Maps of the path of these storms do not disclose any definite lightning-storm lanes or frequent "breeding" spots. General storms affecting a large area at about the same time cause two-thirds of the fires but occur only on one-sixth of the number of days with lightning. Every general storm, but only 44 percent of the local storms, started fires. Most of the individual storms were from 11 to 60 miles long, moved at a rate of from 6

to 20 miles an hour, and traveled in a general northerly direction. On a day of general storm several individual storms originated simultaneously at points 50 or more miles apart. Although definite zones of storm frequency were found, the distribution of the fires within these zones varies too widely from year to year to make the zones reliable indicators of where fires will occur in a given year. The number of fires and the number of storms, however, vary in an approximate ratio with each other.

Human judgment of fire weather often fails at critical periods because man is unable to integrate all the factors properly. Considerable study has been given to the development of cheap and simple field instruments that will do this with reasonable accuracy. A combination of instruments was devised by the Pacific Northwest Forest Experiment Station, which includes a rain gage, a wind-velocity gage and wind vane, a psychrometer, and a fuel-inflammability indicator, and costs less than \$25 to construct. The set is designed to aid timberland operators and fire-control agencies in rating current fire danger. Over 150 of the sets are now in use. For recording fire-weather factors at places not continuously occupied, the Northern Rocky Mountain Station perfected an instrument which records moisture of fuel, both duff and wood, and wind velocity. As an aid in cutting firebreaks, a power brush saw was developed at the California Station. This machine operates with a 1½-horsepower gasoline motor, weighs 100 pounds, and carries 12-inch circular saws. It proved quite successful in dense brush and in stands of small saplings.

EROSION AND STREAM-FLOW INVESTIGATIONS

Erosion-control measures, developed chiefly by the forest and range experiment stations, were applied on western forest and range lands by about 100 camps of the C. C. C. and by other emergency agencies. The restoration of vegetative cover to check erosion and floods is now progressing on some 150,000 acres. Supplemental features are the construction of approximately 40,000 check dams and about 160 miles of fence, the plowing of innumerable contour furrows, the building of many dikes to spread water over drained meadows, and similar work.

An outstanding example is what is being done along the Wasatch Mountain front, in Utah. Recent floods from these mountains have destroyed homes and other urban property, buried highways and valuable farm lands under several feet of boulders, gravel, and other erosion debris, and resulted in the loss of several lives, besides property losses aggregating more than a million dollars. Small head-water areas of private land where the vegetative cover has been seriously depleted or destroyed by overgrazing, fire, and to some extent by timber cutting were the cause. Control measures are being centered principally on restoring vegetative cover on these critical head-water areas, each embracing from a few hundred to a few thousand acres of land. Denuded areas are being planted. On the steeper slopes contour furrows have been plowed to prevent seed wash, to provide a better seed bed, and to conserve maximum moisture. Fences are built to exclude livestock. Despite drought, satisfactory vegetative stands have already been established sufficiently to check run-off and to initiate soil-binding. Small check dams have also been built in gullies to retard cutting until revegetation is completed.

Water users of the Boise irrigation project, in Idaho, are profiting from erosion-stream-flow research carried on by the Intermountain Forest and Range Experiment Station. A remarkably close correlation was found between the annual snow-water content on representative watershed areas of that project and the Boise River flow. This made it possible to forecast a discharge in 1933 that would permit filling both the main Arrowrock and the supplementary reservoir, and those in charge of the project confidently filled both despite the belief of water users that the supply would be insufficient. The result was a more equitable distribution of water and an elimination of waste.

Continued studies of surface run-off and erosion from the main herbaceous types on the Boise River watershed demonstrated the marked superiority of the bunch-grass type over the annual weed and downy-chess types in controlling erosion. The two latter types are, in fact, stages of depletion caused by overgrazing of the bunch-grass vegetation. Under light to medium rains, there is little difference in either the run-off or the erosion from all three types, though the annual-weed type is the least valuable; but under cloudburst rains annual-weed areas had 11 times and downy chess areas more than 4 times the

erosion from the bunch-grass areas. Under treatment simulating trampling, erosion more than trebled on the annual-weed type and increased sevenfold on the downy chess type, but only doubled on the bunch-grass type. With a combined heavy rainfall and trampled conditions, the erosion on the annual-weed type was approximately 21 times and that on the downy chess 19 times as great as on the bunch grass.

Intensive experiments carried on by the Southwestern Forest and Range Experiment Station in Arizona emphasized the value of side-oats grama, a perennial characteristically found on properly managed ranges, in controlling surface run-off and erosion. During the hard rains of the summer of 1933, an area supporting a 31-percent cover of side-oats grama suffered only one-third the erosion and three-fourths the surface run-off that came from a similar area supporting an 18-percent cover of snakeweed and a small amount of side-oats grama. Under showers and light rains the difference was small. It must be borne in mind, however, that depletion from overgrazing is most severe in abnormally dry years, that in these years there is a critical balance between soil moisture and the growth requirements of plants, and that even in these years torrential summer rains are common. They have been known to precipitate as much as 0.75 inch in 5 minutes. On overgrazed ranges most of this water runs off, carrying away fertile topsoil and leaving but little moisture in the remaining soil. On properly utilized ranges, with higher vegetative density, more water is retained and less runs off with erosive violence. A depleted range area in Arizona lost 264 cubic feet per acre of soil and other erosional debris in a single storm. Such results emphasize the importance of restoring perennial grasses on the depleted range of important watersheds as rapidly as possible.

A disastrous flood in Los Angeles County on January 1, 1934, caused the loss of 34 lives, focused public attention on the source of the flood in a fire-denuded watershed, and demonstrated the value of forest cover and the economic wisdom of safeguarding it. A special study of this flood was made by the California Forest and Range Experiment Station. The storm which caused the flood extended over a wide belt of foothills and mountains and deposited an average of 12 inches of rain within 2½ days over a 50-mile front. The watershed from which the flood was discharged—a flood more of mud than of water—comprises 4,000 acres, recently burned over. Neighboring watersheds subject to the same rainfall but with their forest cover intact yielded clear water which caused no unusual erosion and no serious damage. The maximum flood discharge from the burned-over drainage basin reached 1,100 second-feet per square mile, carrying some 67,000 cubic yards of eroded debris. The run-off in San Dimas Canyon, a few miles distant, was only 51 second-feet per square mile and carried only 56 cubic yards of eroded material.

Other studies of the effect of fire on run-off and erosion were continued elsewhere. In the pine region of the Sierras, a 5-year record of the run-off and erosion from repeatedly burned and comparable unburned plots has shown a yearly run-off from the burned area ranging from 31 to 463 times that from the unburned, and a yearly erosion ranging from 22 to 239 times that from the unburned. The run-off from a plot allowed to revegetate after a single burning exceeded the run-off from an unburned check plot by 31 times the first year, as against 11, 5, 15, and 14 times in the subsequent 4 years; and after carrying off 485 times as much eroded material the first year as the check plot, it carried the second year only 81 times as much. In Mississippi a burned-over forest plot eroded at the rate of 1,669 pounds per acre, and a burned-over broomsedge plot at the rate of 1,587 pounds, while unburned check plots yielded only nominal amounts.

FOREST-PRODUCTS RESEARCH

The broad objective of forest-products research is efficient utilization of the forest crop. The uses of competing materials have been vastly expanded and diversified through scientific study, experiment, and invention. Research can similarly enlarge the serviceability of and markets for forest materials. Better yields from available stands, better knowledge and adaptation of wood properties, increased refinement and variety of product, and utilization of neglected species and of material now wasted are among the outstanding objectives.

The Forest Products Laboratory, though handicapped by reduced appropriations in a critical period, had the partially offsetting benefit of considerable allotments of emergency funds. During the term of C. W. A. relief, prog-

ress was speeded by the addition of 51 temporary employees on research projects and 60 on maintenance and clerical work. The outcome more than repaid the time expended by the regular staff in training and supervision. Many tasks needing to be done were assumed by highly qualified personnel who took a keen interest in the work. Improvements in the physical plant and equipment of the Laboratory were made both through C. W. A. help and under N. R. A. allotments. Working conditions were bettered, and research was more adequately supplied with suitable apparatus.

REGIONAL UTILIZATION STUDIES

The less-esteemed southern hardwoods have potentialities for industrial utilization of high importance in connection with land use and the employment of labor over thousands of square miles of territory. The Forest Products Laboratory continued its special investigations relating to these woods and their uses. Further information was obtained correlating the density and the growth rate of hickory, persimmon, tupelo gum, and ash with flood conditions on the site. Preliminary results of the two selective logging studies begun last year on red and water oaks, cow oak, red gum, and ash indicated that for profitable cutting the minimum diameter should range from 16 to 17 inches, as against 14 inches for Lake States hardwoods. Supplementing the large collection of lowland hardwood specimens obtained last year, samples of 12 species were added from the general region of the Tennessee Valley, and all were examined with respect to density, warping and shrinking, texture, straightness of grain, and comparative gluing and bending properties. The wide variation that has been found in the general quality and working properties of southern hardwood species accounts for much of the commercial discrimination against them, and focuses more clearly the problem of segregation according to properties.

Experiments in the new steeping process for drying the southern swamp oaks in heavy-plank sizes continued, along with detailed studies of the shrinkage of the heartwood and sapwood. In most of the seasoning work a solution of common salt was used, but exploratory tests were made with other chemicals, the best of which was monoammonium phosphate. The steeping method holds the promise not only of quick and satisfactory seasoning of difficult woods, but of affording a practical means at the same time of fire-proofing and rendering resistant to decay and insect attack. A nonroyalty patent on the technic developed has been applied for.

Studies of specific uses for southern hardwoods gave interesting results. Office tables were made from salt-seasoned swamp-oak lumber and are proving satisfactory and serviceable in all respects, the finished wood showing no tendency to "weep" in damp weather. Laboratory demonstration floors were laid which will afford a service test of southern gums, sycamore, pecan, maple, and other species. One extensive series of tests dealt with the relative suitability of 12 of the southern species as material for butter containers, with respect to their freedom from taste and odor. Ash (already recognized as high in acceptability), soft maple, hackberry, sycamore, and beech graded above yellow poplar, the species now most commonly used for butter boxes.

One study concerned the use of red oak for beer barrels. Red oaks are abundant in both southern and northern stands, but for many if not most industrial uses the trade preference is for white oak. Nowhere are requirements more stringent than in the beer-cooperage industry. With the coming of repeal of the eighteenth amendment it was felt that the heavy demands already made on decreasing white-oak resources called for some shifting of the burden. Because of its porosity, red oak allows free movement and escape of gases and liquids lengthwise through the wood. After trying various means of plugging the pores it was found that ordinary brewers' pitch could be made to serve the purpose satisfactorily, and simple means were devised for treating the interior of the barrel with the hot pitch under pressure. By this process red oak barrels were made fully as tight as those of white oak. Commercial interest in the new process is widespread.

Laboratory investigations also demonstrated that with proper equipment and drying schedules, stave material can be quickly and satisfactorily kiln-dried. At the time of prohibition repeal the time-honored air-dried stock was largely unobtainable. The experiments were made with southern red and white oak. Numerous cooperage concerns took up the new method, and a large market,

which for some months was strongly inclined toward the substitution of metal containers, was held for wood.

Investigations aimed at bringing timber utilization and naval stores production into a better relationship in the slash-longleaf pine region proceeded with a study of profitable cutting sizes for pulpwood from worked-out trees. Also, improved details of pine rosin barrel construction were developed, and time and cost studies were made in the manufacture of wooden rosin cups of different types.

A circular was prepared for publication on the production of dimension stock from the second-growth hardwoods of the Northeast. Data on the properties of western white fir and their relation to uses of the wood, prepared by the Forest Products Laboratory in cooperation with the California Forest Experiment Station, were published as a technical bulletin. A report of selective-logging studies conducted on four large band-mill lumbering operations in shortleaf and loblolly pine forests of the Gulf States was also published in bulletin form. The experience gained through study of selective logging problems in many timber types and regions proved helpful in conferences leading up to the inclusion of partial-cutting requirements in the national lumber code. The several published findings now available from the studies offer additional assistance to the lumber industry and public agencies in setting up regional logging standards.

WOOD IN THE BUILDING FIELD

The needs of the American public for adequate and economical building and housing create a large field for research in connection with the use of wood as a material of construction. One objective is to develop a strong and serviceable dwelling house of prefabricated-unit construction. Toward this end, special attention was given to the use of plywood. A strong and light floor panel was developed, in which plywood sheets are glued to the top and bottom of several joists. The relatively thick top sheet serves as a subfloor, and the thinner bottom sheet forms the ceiling for the story below. Attachment by gluing instead of nailing adds largely to bending strength, so that for spans common in house construction the required strength and stiffness can be obtained with 6-inch joist instead of the usual 10-inch, saving 40 percent in timber and thickness of the floor system. A considerable saving of time in laying the floor is also made.

The wide recognition of plywood as a coming material for interior and exterior wall covering prompted a series of full-scale wall-unit tests. A type of panel was designed for economical fabrication and tight jointing in the structure, and a number of units were built with different modes of attachment of the plywood to the studding. Lengthwise shearing tests demonstrated that the plywood wall had greater strength and rigidity than sheathed construction, and also disclosed the importance of adequate fastening by good nailing and gluing to obtain full benefit of the strength of the plywood sheet. Many small plywood specimens were tested to supply data for establishing fundamental design principles for the material.

Further tests were made in the interest of better knowledge and use of the newer forms of heavy-timber construction. The strength of joints made with plate and ring connectors was studied under many variations, to supply all the minor details required by the practical designer. This work supplements the general survey of safe loads for the new connectors which the laboratory previously conducted in cooperation with the National Committee on Wood Utilization. The earlier studies have contributed to the increasing use of plate and ring connectors in general construction. The Forest Service aided this development by offering to accept bids for fire look-out towers to be constructed either of steel or of timber, and contracts were let for 8 wood towers, 7 of them 100 feet high, to be built in the South, in California, and in the Lake States. The designs, which were prepared by the National Lumber Manufacturer's Association and inspected and approved by the laboratory, illustrate the advantages inherent in the use of modern connectors, namely, prefabrication of parts at the mill, complete pretreatment of the framed members with preservative, easy erection on the site, and dependable strength properties combined with permanence.

Strength data for glued timber arches were supplemented by time-loading tests, indicating that the laminated arch comes to final bearing position under

safe loads in a shorter time and with less deflection than a solid arch of the same dimensions. Test data on the resistance of woods to lateral withdrawal of nails and screws and to direct withdrawal of drift pins were amplified and correlated for engineering use. Certain parts of the wood handbook manuscript were redrafted in consultation with architects, engineers, and lumber producers and users, and the whole should be ready for publication at an early date.

A simplification of the Laboratory's previous recommendations for the more efficient and economical design of bridge stringers and similar wood members subject to shear was published, and the principles set forth now stand generally accepted and adopted by the engineering profession. A guide to the grading of structural timbers was published in furtherance of the long-time objective of establishing timber grades on the effective basis of strength rather than arbitrary defect allowances.

Salt-seasoning methods were applied to Douglas fir timbers 6 by 12 inches in cross section, with phenomenal results. The time required to reduce the moisture content from 62 to 20 percent was shortened from the 60 days required in ordinary kiln practice to 8 days, and checking was reduced from the 1½-inch to 2-inch depth commonly occurring to a mere surface effect not exceeding one-eighth inch in depth. The experiments are now being extended to timbers of larger sizes and to other species.

Investigations of lumber storage demonstrated a very economical method of heating closed sheds sufficiently to control humidity and to hold stock at a low moisture content.

Progress was made in research on various treatments of wood to improve its properties as a material of construction and use. A method of modifying linseed oil which promises to make paint films tougher and more adhesive was developed. Much work was done on the impregnation and coating of wood with fire retardants, and new information was obtained as to the degree of protection afforded by different chemicals. One of the facts brought out by the tests was that not only can risk of ignition be reduced by proper chemical treatment but a much larger input of heat can be tolerated before the treated wood is destroyed. Service tests of fence posts treated with a newly devised solution of tetrachlor-phenol in waste crank-case oil were begun, which may open the way to large savings in cost of preservation of wood for farm use. Technical consultation was had with officials of the Alaska Railroad in the project of establishing a tie- and timber-treating plant near the town of Anchorage. A bulletin was prepared for publication defining and analyzing the various factors involved in impregnation treatments of wood and showing how impregnation with different preservatives can be most efficiently done. This bulletin summarizes work that has been carried on over a number of years with increasing industrial recognition.

PULP, PAPER, AND CHEMICAL PRODUCTS

Research should and will lead to the conversion of more of the forest crop into refined products. A cord of wood will provide more jobs, higher wages, more tax revenue, and greater opportunities for capital investment if converted into paper or alcohol, plastics, and other chemical products, than into lumber, railway ties, and the like. While American paper-manufacturing practice, neglecting difficult native species, looks to a huge and mounting bulk of imported pulp and pulpwood to supply home needs, millions of cords of our own woods are wasted in logging, cut-over lands lie unproductive, and employment equivalent to 70,000 full-time jobs is "exported" to supply us with foreign raw material. The Forest Products Laboratory work in this field has for its broad aim larger, cheaper, more diversified, and more beneficial production of pulp and chemical products from American woods. Opportunities for modernizing and enlarging the technical plant arose during the year that made possible a better follow up of results through closer control of machinery and larger and more uniform samples, and facilitated advance in research problems.

Progress toward minimizing the pollution of streams through the discharge of waste sulphite-pulping liquors while extending the technical advantages of sulphite pulping to a wider range of wood species was made by developing a recovery system for chemicals in the soda-base process that eliminates the troublesome thiosulphates. Several digestions with liquor prepared by the

new system have proved entirely successful, and application for a nonroyalty patent on the method has been made. It is believed that the cost of operation would not exceed present recovery costs in the alkaline-pulping processes. Study of the effects of varying sulphur dioxide concentration in soda-base sulphite pulping revealed that at a low concentration the screenings from the pulp were less and the bleach requirement was slightly lower than in pulping with the customary lime-base liquors of equivalent composition.

In further studies of alkaline pulping of Douglas fir, it was found possible to cook the wood to normal pulp yields with concentrations of chemical much lower than those now used, by holding the strength of the chemical liquor undiminished throughout the cooking period. The bleach requirement of the resulting pulp is lower, and the unbleached pulp is, in general, brighter in color than commercial pulps of the same grade; the pulp is strong enough for use in high-grade papers; and it is exceptionally high in alpha-cellulose—a quality suggesting its possible utilization in rayon.

Significant progress was made in the production of newsprint from southern pines. Public interest in the manufacturing possibilities of southern pine newsprint has been greatly increased by the work of C. H. Herty, who has developed newsprint from young slash pine free of heartwood, using the standard sulphite and ground-wood processes. The Laboratory's method combines ground wood from heart-free pine with strong semibleached or unbleached sulphate pulp from pine containing the normal proportion of heartwood. The strength and color of this paper compares satisfactorily with average commercial newsprint, its raw material corresponds more closely to the natural growth of pine stands than does heart-free wood, and its production would fit more easily into the operations of pine sulphate mills now existing.

In the investigation of ground-wood production from western hemlock, the cause of the dark color frequently characterizing the pulp was traced to a dyestuff of the same kind as that identified last year in southern pine, presumably arising from tannin. In hemlock this material was found largely localized as reddish-brown granules in the ray cells. While the dye can be bleached with fair success by reducing agents, its peculiar concentration suggests that its removal may be possible by mechanical separation. The chemistry of the material is also under investigation to determine any other effective means of color removal, the finding of which would profoundly influence the utilization of many American woods.

Substantial progress was made in the investigation of the strength properties of fiber board, looking to the more efficient design of fiber shipping containers, which represent one of the greatest quantity uses of wood pulp.

In the development of sawdust plastics, specimens were produced that are as strong as softwood, free from corrosive material, and capable of being molded satisfactorily in the polished dies used by manufacturers. The new material represents a considerable technical advance, and an application for nonroyalty patent on the process is pending.

The development of the full possibilities of wood use is bound up with more fundamental knowledge of the composition and formation of the material itself. In this complex field of research definite progress was made. Three lines of investigation of the chemical properties of lignin were followed up. Refinements in method made possible the isolation of lignin free of tannins and other extractives. Viscosity measurements indicated a spherical form of the lignin molecule, and an examination of methoxyl and hydroxyl groups present in the material added significant outlines of its chemical nature. Holocellulose, the subdivision of wood substance containing the fibrous and carbohydrate constituents, was more definitely characterized, and its relationships with standard Cross and Bevan cellulose were determined. An intensive phytochemical survey of the phloem of slash pine was practically completed, through which a new view of oleoresin formation has been gained. Evidence was obtained that oleoresin exists in the active tissues of the tree in the form of a water-soluble glucoside, in which form it is translocated to the point of effusion. A systematic survey of the terpenes resulted in a new classification of these bodies based on a biogenetic theory of their origin.

In addition to the publications already mentioned, manuscripts of the naval stores handbook, revised tables of the mechanical properties of American woods, and a method of determining container hazards during transportation were prepared. A technical bulletin on the structure of compression wood as related to its properties and a handbook on the selection of lumber for farm and home are nearing completion.

RANGE INVESTIGATIONS

Range-research facilities were taxed to the utmost during the year in supplying information for the emergency programs, through supervision, inspection, demonstration, and written instructions. The C. C. C. and other agencies utilized the results of artificial-reseeding research extensively in planting depleted range lands for range improvement and erosion control. Several hundred tests throughout the West had shown which cultivated plants were adapted to dry western range lands; and more recently, desirable native species from all parts of the West have been tested at the Intermountain Forest and Range Experiment Station in central Utah.

Six wheatgrasses were found to be outstanding, with violet wheatgrass exceptionally well adapted for range sowings above 7,100 feet. Large mountain brome displayed similar adaptability; two other brome-grasses also gave good results. On the other hand, most fescues, bluegrasses, and needlegrasses were unsatisfactory. Only 7 of the 33 weeds tested demonstrated satisfactory utility. Pentstemon, yarrow, and sweet sage are readily established and are especially valuable in erosion control because they bind the soil by their network of rootstocks. Shrubs proved unimportant either for seeding or planting except along stream banks that are cutting.

Knowledge of this kind served to guide the emergency reseeding work not only in respect to what to plant and what to avoid but also in respect to the methods to use. More than 30,000 acres of seriously depleted lands were sown to various cultivated plants, and 10,000 acres were planted to the more promising native species, generally on the drier sites.

A 9-year study of grazing capacity and time of use on sagebrush-wheatgrass range in southern Idaho has shown the importance of conservative grazing on that type of range, and of permitting the principal forage plants to make a reasonable growth before close grazing is permitted. This study was conducted by the Intermountain Forest and Range Experiment Station in cooperation with the Bureau of Animal Industry. A close relationship was shown between the total annual rainfall and range-forage production. The latter was measured in terms of the number of sheep-days required to utilize the feed fully. The 9-year average in a representative 80-acre paddock was approximately 5,200 sheep-days, but with a wide variation of from about 4,000 sheep-days in the driest year to nearly 8,500 sheep-days in the wettest.

When this range type, in reasonably good condition, was stocked at 1.15 acres per head per month during the spring and fall seasons, adequate feed for the sheep was supplied, and sustained production in all but the two driest years was assured; but when it was stocked at 1 acre per head per month, which is lighter use than much of the spring-fall range in that section now receives, feed shortage resulted in 5 of the 9 years. One area grazed heavily in the fall as well as from the time of available forage in early spring produced 35 percent less forage in 1932 than in 1924. Palatable weeds and grasses decreased 75 percent, while sagebrush, which is practically worthless, increased 73 percent. On the other hand, a paddock grazed moderately to lightly in the spring after grasses reached a height of 6 inches, and grazed again quite fully in the fall, maintained forage production. Studies are now being made to determine how heavily range may be grazed from early spring without damaging forage production.

The Sierra foothills adjoining the San Joaquin Valley in central California present a serious problem of range use and watershed protection. As fall, winter, and spring ranges they constitute the natural connecting link between the high summer ranges in the mountains and the supplemental feed lots in the valleys, but drought, overgrazing, and fire have depleted the forage stand and caused serious acceleration of erosion. While a few scattered ungrazed areas have been found which still support a good stand of perennial grasses and weeds, most of the vegetative cover is now made up chiefly of short-lived annual plants, mainly grasses and weeds of low value, or even injurious. In the higher foothills dense stands of brush have developed, which the stockmen have tried to open by burning; but the fires have reduced soil fertility, have thickened the brush, and have pushed the timber-producing belt back several miles. Growth conditions in the foothills are critical over most of the area. Of the 13½-inch annual precipitation, 12 inches falls in the months from November to April, when the temperature is at first usually too low to permit more than an inch or two of growth; and even that is ordinarily cropped closely. Warm weather in March facilitates rapid growth of the annuals, but they are virtually dried up by mid-June. To facilitate the solution of the many

important foothill-range problems, the San Joaquin Experimental Range was established during the year. It offers close contact with the livestock industry, correlation with national-forest management, and cooperation with the erosion-stream-flow studies of the California station.

EXPENDITURES AND RECEIPTS

The expenditures during the fiscal year were as follows:

General administration.....		\$528, 426. 31
Administration, protection, improvement, reforestation, and extension of national forests:		
Operating expenditures:		
Timber use.....	\$430, 419. 61	
Grazing use.....	570, 991. 67	
Recreation and land use.....	238, 150. 49	
Fish and game protection.....	109, 982. 39	
Classification, settlement, and claims.....	64, 631. 57	
Maintenance of truck and horse trails.....	1, 674, 880. 77	
Maintenance of other improvements.....	916, 028. 54	
Subtotal.....		\$4, 005, 085. 04
Protection expenditures:		
Fire prevention and detection.....	1, 882, 616. 08	
Fire suppression.....	567, 730. 98	
Class total (fire).....	2, 450, 347. 06	
Protection against insects and tree diseases.....	328, 263. 04	
Subtotal.....		2, 778, 610. 10
Investment expenditures:		
Construction of truck and horse trails.....	18, 490, 252. 11	
Construction of other improvements.....	9, 413, 514. 69	
Equipment and stores.....	8, 902, 334. 30	
Timber surveys and plans.....	234, 356. 89	
Grazing surveys and plans.....	97, 591. 88	
Fish and game surveys and plans.....	24, 364. 91	
Recreational use surveys and plans.....	64, 889. 79	
General surveys and maps.....	266, 289. 61	
Timber stand improvement.....	2, 235, 444. 97	
Reforestation of denuded areas.....	549, 534. 33	
Nurseries and planting stock.....	136, 064. 70	
Acquisition of land by direct purchase.....	2, 742, 611. 42	
Acquisition of land by exchange.....	1 54, 867. 13	
Nonstructural improvements (erosion, tree disease and insect control, fire hazard reduction, and miscellaneous investments not otherwise classified).....	3, 354, 227. 34	
Subtotal.....		46, 566, 344. 07
Construction and maintenance of forest highways:		
Construction of forest highways.....	13, 669, 791. 30	
Maintenance of forest highways.....	984, 505. 43	
Subtotal.....		14, 654, 296. 73
Total, national forests.....		68, 004, 335. 94
Research:		
Research current expenditures:		
Forest management.....	613, 954. 03	
Range investigations.....	124, 521. 37	
Forest products.....	709, 176. 05	
Forest survey.....	199, 247. 62	
Forest economics.....	74, 798. 29	
Erosion and streamflow.....	104, 292. 24	
Forest taxation and insurance.....	28, 838. 26	
Maintenance of roads and trails.....	7, 814. 94	
Maintenance of other improvements.....	35, 793. 42	
Subtotal.....		1, 898, 436. 22
Research investments:		
Construction of roads and trails.....	25, 248. 69	
Construction of other improvements.....	363, 277. 42	
Equipment and stores.....	181, 020. 10	
Timber surveys and plans, experimental areas.....	1, 838. 54	
General surveys and maps, experimental areas.....	4, 267. 30	
Timber stand improvement, experimental areas.....	6, 442. 37	
Reforestation of denuded areas, experimental areas.....	15, 808. 13	
Acquisition of land by direct purchase.....	28, 242. 22	
Nonstructural improvements on experimental areas (erosion, tree disease and insect control, fire hazard reduction, and miscellaneous investments not otherwise classified).....	35, 392. 79	
Subtotal.....		661, 537. 56
Total.....		2, 559, 973. 78

Protection and reforestation of other than national-forest lands:	
Tree planting in cooperation with States.....	\$58,782.73
Fire protection in cooperation with States.....	1,800,833.92
Protection of Oregon and California grant lands.....	56,332.59
Extension of forestry practice on State and private lands.....	126,547.95
Total.....	\$2,042,497.19
Miscellaneous:	
Emergency unemployment relief; general planning and direction of emergency conservation work.....	1,049,104.25
Emergency unemployment relief; civil works administration.....	941,214.74
Tennessee Valley authority; emergency conservation work.....	400,205.40
Insular forests, Puerto Rico; emergency conservation work.....	138,138.95
Examination and administration of power sites for Federal Power Commission.....	15,085.01
Miscellaneous cooperation with other departments, bureaus, and individuals.....	305,687.97
Total.....	2,849,436.32
Grand total.....	75,984,669.54

The following statement shows the gross and net cash receipts from the national forests:

Gross receipts:	
From the use of timber.....	\$1,522,356.19
From the use of forage.....	1,358,688.01
From special land uses, water power, and miscellaneous receipts.....	433,647.14
Total.....	\$3,314,691.34
Amounts paid to States:	
To Arizona and New Mexico (account school lands administered by the Forest Service).....	23,242.59
To States in which national forests are located (act of May 23, 1908).....	822,862.19
Total to States.....	846,104.78
Net total receipts to United States Treasury.....	2,468,586.56

The total of the gross receipts is greater by \$688,642.20 than that for the previous year. Receipts from timber increased \$739,547.86, grazing receipts decreased \$139,520.81, and miscellaneous receipts increased \$88,615.15.

In addition to the cash receipts from timber there should be credited the value of the timber cut under specific agreements for effecting land exchanges, estimated at \$212,322.00.

¹ In addition to the expenditure for acquisition of land by exchange, national-forest timber having an estimated value of \$212,322 was cut under agreements involving the acquisition of land and timber through exchange. The cash expenditures recorded opposite "Acquisition of land by exchange" cover merely the outlay incidental to examining lands offered for exchange and appraising the value involved.

ANNUAL REPORT OF THE CHIEF OF THE GRAIN FUTURES ADMINISTRATION, 1934

UNITED STATES DEPARTMENT OF AGRICULTURE,
GRAIN FUTURES ADMINISTRATION,
Washington, D.C., September 1, 1934.

SIR: I submit herewith a report of the work of the Grain Futures Administration for the fiscal year ended June 30, 1934.

Respectfully,

J. W. T. DUVEL, *Chief.*

Hon. HENRY A. WALLACE,
Secretary of Agriculture.

The Grain Futures Administration during the year just ended supervised trading in grain futures on the grain exchanges that have been designated as contract markets by the Secretary of Agriculture under the Grain Futures Act of 1922. There was no future trading during the year on 3 of the 15 contract markets, namely, the Baltimore Chamber of Commerce, the New York Produce Exchange, and the Omaha Grain Exchange.

The total volume of trading in grain futures during the year aggregated 15,540,-870,000 bushels, an increase of 9 percent over the preceding year's aggregate of 14,247,204,000 bushels, and a decrease of 22 percent from the 10-year (July 1, 1923-June 30, 1933) average annual volume of 19,889,495,000 bushels. The total volume of trading in wheat futures, 10,093,259,000 bushels, constituted 65 percent of the aggregate volume in all grain futures, and a reduction of 7 percent below the previous year's total volume of 10,890,295,000 bushels. The volume of trading during the year in corn futures aggregated 3,314,266,000 bushels, an increase of 37 percent, as compared with the 2,424,850,000-bushel volume recorded for the preceding year. The volume of trading in oats futures increased 155 percent during the year, as compared with the preceding year's total of 570,839,000 bushels, the aggregate volume amounting to 1,457,085,000 bushels, the largest annual volume recorded since the fiscal year ended June 30, 1925. The volume of trading in rye futures aggregated 494,660,000 bushels, an increase of 93 percent, as compared with the aggregate volume during the preceding year of 256,170,000 bushels. The 163,615,000-bushel volume of trading in barley futures recorded for the year constitutes an all-time record volume in this grain for the 13-year period during which records have been compiled by the Administration, and represents an increase of 107 percent, as compared with the preceding year's volume of 79,016,000 bushels. The volume of trading in flax futures aggregated 17,985,000 bushels, a decrease of 31 percent from the preceding year's 26,034,000-bushel volume.

Of the aggregate annual volume of trading in all grain futures at all markets, 85.5 percent was transacted on the Chicago Board of Trade, the total volume on this exchange amounting to 13,282,898,000 bushels, an increase of 10 percent over the 12,124,894,000-bushel volume recorded for the preceding fiscal year. An all-time record daily volume of trading on the Chicago Board of Trade was established during the year when, on July 20, 1933, the day's sales of grain futures amounted to 269,413,000 bushels, as compared with the previous record daily volume of 256,529,000 bushels, recorded on March 13, 1925. Sales of wheat futures on the Chicago Board of Trade on July 20, 1933, aggregated 163,099,000 bushels, as compared with the previous daily record volume of 156,126,000 bushels on October 24, 1929.

The aggregate annual volume of trading in wheat, corn, oats, rye, barley, and flax futures on each contract market upon which future trading was conducted during the year, and on all markets combined, is shown in table 1. The average, maximum, and minimum daily volume of trading in each grain future, and all futures combined, on the Chicago Board of Trade during the past year, with the respective dates, is shown in table 2. The monthly volume of trading in wheat and corn futures, respectively, on each contract market where these futures were traded in, is shown in tables 3 and 4.

TABLE 1.—*Total volume of trading in wheat, corn, oats, rye, barley, flax, and all grain futures combined on the contract markets, fiscal year ended June 30, 1934*

[In thousands of bushels; i.e., 000 omitted]

Market	Wheat	Corn	Oats	Rye	Barley	Flax	All grains
Chicago Board of Trade.....	8,398,605	3,086,356	1,314,307	424,959	58,671	-----	13,282,898
Chicago Open Board of Trade.....	248,600	44,345	7,034	268	-----	-----	300,247
Minneapolis Chamber of Commerce.....	605,260	-----	127,398	55,196	103,277	11,741	902,872
Kansas City Board of Trade.....	734,532	169,948	-----	-----	-----	-----	904,480
Duluth Board of Trade.....	71,969	-----	-----	10,438	-----	6,244	88,651
St. Louis Merchants Exchange.....	6,092	-----	-----	-----	-----	-----	6,092
Milwaukee Grain and Stock Exchange.....	18,663	13,617	8,346	3,799	1,331	-----	45,756
Seattle Grain Exchange.....	6,035	-----	-----	-----	-----	-----	6,035
Portland Grain Exchange.....	3,327	-----	-----	-----	-----	-----	3,327
Hutchinson Board of Trade Association.....	176	-----	-----	-----	-----	-----	176
San Francisco Chamber of Commerce.....	-----	-----	-----	-----	240	-----	240
Los Angeles Grain Exchange.....	-----	-----	-----	-----	96	-----	96
Total.....	10,093,259	3,314,266	1,457,085	494,660	163,615	17,985	15,540,870
Percent of total trading done on Chicago Board of Trade.....	83.2	93.1	90.2	85.9	35.9	-----	85.5

TABLE 2.—*Average, maximum, and minimum daily volume of trading in each grain future and all futures combined on the Chicago Board of Trade during the fiscal year ended June 30, 1934, with dates of largest and smallest day's trading*

[In thousands of bushels; i.e., 000 omitted]

Grain	Average daily volume of trading	Largest volume of trading in single day		Smallest volume of trading in single day	
		Volume	Date	Volume	Date
Wheat.....	28,089	163,099	July 20, 1933	1,202	Aug. 14, 1933
Corn.....	10,322	67,451	do.....	960	Mar. 24, 1934
Oats.....	4,396	27,748	do.....	281	Aug. 15, 1933
Rye.....	1,421	11,965	do.....	82	Feb. 16, 1934
Barley.....	196	3,705	July 18, 1933	-----	(¹)
All grains.....	44,424	269,413	July 20, 1933	3,159	Aug. 14, 1933

¹ Frequently.TABLE 3.—*Wheat futures: Monthly volume of trading on the contract markets, by markets, during the fiscal year ended June 30, 1934*

[In thousands of bushels; i.e., 000 omitted]

Market	1933					
	July	August	September	October	November	December
Chicago Board of Trade.....	1,684,935	646,815	661,556	832,751	743,386	447,796
Chicago Open Board of Trade.....	32,161	21,885	26,145	26,067	22,789	18,129
Minneapolis Chamber of Commerce.....	96,930	70,858	55,532	54,778	62,523	28,242
Kansas City Board of Trade.....	164,629	66,834	47,261	65,232	75,259	29,888
Duluth Board of Trade.....	14,557	10,436	9,244	6,844	7,928	3,588
St. Louis Merchants Exchange.....	931	503	603	921	1,586	315
Milwaukee Grain and Stock Exchange.....	4,308	1,179	1,322	1,608	1,521	952
Seattle Grain Exchange.....	948	632	461	254	1,382	296
Portland Grain Exchange.....	758	511	251	160	806	120
Hutchinson Board of Trade Association.....	29	17	6	21	5	22

TABLE 3.—Wheat futures: Monthly volume of trading on the contract markets, by markets, during the fiscal year ended June 30, 1934—Continued

[In thousands of bushels; i.e., 000 omitted]

Market	1934					
	January	February	March	April	May	June
Chicago Board of Trade.....	437, 163	320, 677	307, 139	523, 171	891, 771	901, 445
Chicago Open Board of Trade.....	16, 245	12, 960	12, 819	10, 939	25, 156	23, 305
Minneapolis Chamber of Commerce.....	30, 798	22, 359	25, 348	43, 945	55, 697	58, 250
Kansas City Board of Trade.....	30, 279	23, 313	23, 450	47, 183	66, 507	94, 697
Duluth Board of Trade.....	2, 695	2, 123	2, 740	3, 756	3, 914	4, 144
St. Louis Merchants Exchange.....	394	161	159	440	69	10
Milwaukee Grain and Stock Exchange.....	1, 083	813	1, 003	1, 071	2, 010	1, 793
Seattle Grain Exchange.....	155	153	134	740	608	272
Portland Grain Exchange.....	28	11	26	520	60	76
Hutchinson Board of Trade Association.....	22	12	11	12	13	6

TABLE 4.—Corn futures: Monthly volume of trading on the contract markets, by markets, during the fiscal year ended June 30, 1934

[In thousands of bushels; i.e., 000 omitted]

Market	1933					
	July	August	September	October	November	December
Chicago Board of Trade.....	748, 490	265, 788	187, 833	336, 853	291, 275	198, 311
Chicago Open Board of Trade.....	9, 242	5, 093	4, 276	5, 600	3, 644	3, 071
Kansas City Board of Trade.....	55, 231	16, 231	9, 030	15, 367	13, 733	10, 048
Milwaukee Grain and Stock Exchange.....	2, 611	982	939	1, 327	1, 282	848

Market	1934					
	January	February	March	April	May	June
Chicago Board of Trade.....	110, 323	65, 566	68, 194	208, 577	244, 672	360, 474
Chicago Open Board of Trade.....	2, 248	1, 033	910	1, 676	3, 198	4, 354
Kansas City Board of Trade.....	6, 622	3, 081	4, 253	12, 820	9, 123	14, 409
Milwaukee Grain and Stock Exchange.....	514	465	476	1, 253	942	1, 978

INVESTIGATION OF PRICE COLLAPSE

Following the sensational price collapse in the grain-futures market on July 19 and 20, 1933, during which Chicago wheat futures recorded an extreme decline of 24½ to 27½ cents, and corn futures an extreme decline of 17½ to 18¾ cents, the Administration conducted an investigation to ascertain the factors responsible for the collapse, the requirement that reports showing the individual commitments of large operators be furnished daily to the Administration having been suspended on October 24, 1932, by the then Secretary of Agriculture, Arthur M. Hyde.

It was found that the debacle resulted principally from the activities of not more than 10 traders, who controlled 15 large speculative accounts and gradually accumulated inordinately large holdings of both wheat and corn futures during the weeks preceding the collapse, that a large portion of these tremendous holdings was suddenly dumped upon the market, and that while this large-scale liquidation in its early stages was for the taking of profits by large operators, it quickly compelled the liquidation of large accounts that were inadequately margined. It was found that there were 30 speculative accounts in Chicago wheat futures and 21 speculative accounts in Chicago corn futures, each of which amounted to one million bushels or more sometime during the period from June 14 to July 31, 1933. These large speculative wheat futures accounts aggregated 51,198,000 bushels net long on July 14, an increase of 20,000,000 bushels during the month. Commencing on July 18 rapid liquidation began in these accounts, with the result

that on July 31 they amounted to only a little more than 19,000,000 bushels. The short interest in wheat futures in these million-bushel-and-over speculative accounts was relatively small throughout the whole period studied.

The holders of 10 large wheat-futures accounts, 2 large corn-futures accounts, and 3 accounts in both wheat and corn futures were found to have engaged in selling on a large scale shortly before and during the price decline. On July 17 this group of 15 accounts, controlled by not more than 10 individuals, had a long position in Chicago wheat futures of 30,795,000 bushels. By slight liquidation on July 18 this position was reduced to 29,200,000 bushels. On July 19 sales amounted to more than 7,000,000 bushels and on July 20 to more than 6,000,000 bushels, with the result that the aggregate long interest remaining in these 15 accounts at the close of the market on July 20 had been reduced to 15,320,000 bushels, or less than half of the holdings on July 17. It is believed that each of these 15 large accounts was reasonably well protected and that the liquidation of these accounts was for profit-taking purposes rather than forced liquidation.

When the market reopened on July 24 heavy selling developed in other large accounts, the holders of which were unable to weather the drastic price decline, the major part of this liquidation coming from a group of five accounts which apparently had been operated under the control or guidance of one individual. These thinly margined accounts were forced to liquidate their entire holdings of 18,000,000 bushels of wheat futures and 4,000,000 bushels of corn futures during the 3-day period from July 24 to 26. During the same period the corn-futures holdings of two other large accounts were being forced on the market, one of which aggregated 13,075,000 bushels and the other 2,835,000 bushels. Both of these accounts, practically in their entireties, were liquidated during the 3-day period. These 7 accounts in wheat and corn futures, apparently controlled by only 3 traders, liquidated nearly 38,000,000 bushels of wheat and corn futures in 3 days. While the liquidation of these 7 accounts did not occur until after the price collapse of July 19 and 20, it is nevertheless probable that these holdings were to some degree indirectly responsible for the prior liquidation of the 15 large accounts, inasmuch as it appears to have been rather generally understood among the better informed speculators that certain accounts were in somewhat precarious condition, and it is very probable that some of the original liquidation immediately before the decline was actuated by this knowledge. This economic catastrophe again demonstrates conclusively that the concentration in a few large accounts of too great a proportion of the total open commitments in grain futures is virtually certain to result in erratic price movements irrespective of whether such inordinately large accounts be on the long side or on the short side of the market.

LEGISLATION RECOMMENDED

For the purpose of preventing untoward market situations arising from the abuse of the existing future-trading facilities by a few large operators, additional legislation to supplement and reinforce the Grain Futures Act was recommended during the year by the Secretary of Agriculture with the approval of the President. A bill empowering the Commission created by the Grain Futures Act to fix limits upon the speculative transactions and commitments of individual operators with a view to preventing the accumulation of excessive lines of futures and their subsequent dumping in amounts impossible for the market readily to absorb without serious derangement of the price structure was passed by the House of Representatives during the closing days of the Seventy-third Congress. The measure also included provisions for the licensing by the Secretary of Agriculture of grain-futures commission merchants accepting orders from the public as well as pit brokers engaged in executing such orders, and for the prohibition of practices involving cheating and fraud incident to the handling of customers' orders. This legislation failed to receive final consideration by the Senate prior to adjournment.

LITIGATION

During the year the Commission created by the Grain Futures Act (composed of the Secretary of Agriculture, chairman, the Attorney General, and the Secretary of Commerce) disposed of the complaints that had been filed by the Secretary of Agriculture against William B. Massey, John S. Reddy, and Philip J. Reddy, members of the Chicago Board of Trade. The complaints charged the respondents with manipulating the price of grain, disseminating false and misleading market reports, and failing to keep records required by the Grain Futures Act. The Commission found that respondents Massey and John S. Reddy, while serving as pit brokers on the Chicago Board of Trade and entrusted by their employers (com-

mission houses) with customers' orders for wheat futures, instead of executing such orders through transactions with other members of the Chicago Board of Trade, as required under board of trade rules, took the "orders into their own personal accounts on the books of the third respondent, Philip J. Reddy, at prices determined and fixed by themselves", but within the price range in effect during the period that the orders were in the brokers' possession for execution. The complaint charged that the price differences taken by the two broker respondents constituted deviations from the true prevailing market price of wheat for future delivery, and that as to the customers whose orders were thus handled and as to the particular quantities of grain involved, the practices complained of constituted manipulation of the price of grain.

The Commission in dismissing the case said in part:

While practices of the character here involved may be detrimental to customers and may even amount to fraud, we nevertheless find difficulty in adopting the view that these constituted manipulations of the market price of grain within the meaning of the Grain Futures Act. We believe the terms "manipulate" and "manipulation" as used in the act relate to efforts to stimulate or depress the market price of grain. We do not believe that they apply to practices between brokers and their principals where the failure of customers to receive the benefit of full market price grows primarily out of acts which in reality amount to breach of duty imposed by a fiduciary relation. These practices may constitute serious evils affecting the economical marketing of grain in a way to burden interstate commerce. They may be matters which ought to be remedied by legislation. Nevertheless, they constitute essential violations of fiduciary obligations, and it is not demonstrated to our satisfaction that they affect directly general price movements. * * *

It does not appear that respondents changed or attempted to change the general level of prices. Only their principals, or more properly speaking, only the customers of their principals in the particular transactions, suffered unless, perhaps, the trades involved hedges of cash grain and an indirect effect was had on prices paid producers by reason thereof. This is not shown to our satisfaction. We hold that the practices here involved do not constitute manipulation of prices within the meaning of the Grain Futures Act.

The part played by the third respondent, Philip J. Reddy, according to the Commission was—

to clear the transactions through the Board of Trade Clearing Corporation as if and though they were bona fide executions of trades in the wheat pit of the Chicago Board of Trade.

The Commission held that since the charges against the other two respondents "fail in law they necessarily must be held to fail also against Philip J. Reddy."

The injunction suit brought by Bartlett Frazier Co. of Chicago against the Secretary of Agriculture, the Administration's grain-exchange supervisor at Chicago, and the United States district attorney at Chicago was brought to a final conclusion during the year by the declination of the Supreme Court to grant the plaintiff's petition for a writ of certiorari to the United States Circuit Court of Appeals for the Seventh Circuit to review that court's decision affirming the decision of the district court in favor of the Government. The plaintiff, a grain-commission corporation, joined by other commission merchants, had sought to enjoin the enforcement of the rules and regulations promulgated by the Secretary of Agriculture under the Grain Futures Act requiring clearing members of the Chicago Board of Trade and other contract markets to report to the Administration the open commitments in grain futures of large operators and the aggregate volume of trading and open commitments of all customers. The plaintiff and the interveners sought also to prevent the examination of their books and records by the Administration under the provisions of the Grain Futures Act. The decision of the United States District Court for the Northern District of Illinois denying the injunction sought by the commission merchants was affirmed by the unanimous decision of the United States Circuit Court of Appeals for the Seventh Circuit, and the denial of a writ of certiorari by the Supreme Court terminated the litigation.

A complaint by the Secretary of Agriculture under the Grain Futures Act against Adrian Ettinger and Ewing W. Brand, members of the Chicago Board of Trade, was filed and hearing thereon held before a referee during the year. The complaint alleged that the respondents violated the Grain Futures Act in failing to keep records and in concealing from the Administration the facts concerning transactions in grain futures on the Chicago Board of Trade in May, June, and July 1933, and that the respondents rendered false reports and gave the names of fictitious persons as being parties to the transactions, which at one time involved an aggregate open interest in Chicago wheat futures of nearly 20 million bushels. The respondents were called upon to show cause why an order should not be issued against them individually and against their copartnership, Ettinger & Brand, directing that trading privileges on all contract markets be denied them until further notice. The case was pending at the close of the year.

A decision was rendered during the year by the United States Circuit Court of Appeals for the Seventh Circuit upon the appeal by the Chicago Board of

Trade from the decision of the Commission created by the Grain Futures Act upon the complaint filed during the preceding year by the Farmers National Grain Corporation against the Chicago Board of Trade. The Commission had ordered the contract-market designation of the Chicago Board of Trade suspended for 60 days by reason of the board's refusal to admit the Farmers National, a cooperative association, to membership in the Board of Trade Clearing Corporation in alleged violation of section 5 (e) of the Grain Futures Act, the Commission reserving the right to mitigate the penalty decreed should the board of trade recede from its position with respect to the Farmers National.

The circuit court of appeals in a unanimous decision upheld the Commission on each of the several points raised by the Chicago Board of Trade on appeal and considered by the court, save one. The Commission had held that the vast volume of business done by the Farmers National with the Grain Stabilization Corporation was neither member nor nonmember business within the meaning of the Capper-Volstead Act, which requires that cooperative associations may not deal in the products of nonmembers to an amount greater in value than the products handled by it for members if such associations are to enjoy the immunities granted by the act. Upon this point the circuit court of appeals decided that the Commission was not warranted in holding Grain Stabilization Corporation business to be neither member nor nonmember business, and that such transactions must be classified either as member or as nonmember dealings. The court therefore directed that the order of the Commission be set aside and the case remanded to the Commission for classification of the volume of business transacted by Farmers National for the Grain Stabilization Corporation. Subsequent to this decision the Farmers National was admitted to clearing-house privileges on the Chicago Board of Trade, the cooperative association having accompanied its reapplication for such privileges with an affidavit that at the date of its reapplication it did not deal in the products of nonmembers to an amount greater in value than products handled by it for members. A petition for a writ of certiorari to review the decision of the circuit court of appeals, filed by the Commission, was denied by the Supreme Court, and the case was pending at the close of the year.

A complaint under the Grain Futures Act was filed by the Secretary of Agriculture during the year against Arthur W. Cutten, member of the Chicago Board of Trade, alleging that the respondent had violated the act and the rules and regulations pursuant thereto in concealing his transactions and open commitments in Chicago wheat futures, by failing to make reports to the Administration, by making alleged false reports, and allegedly conspiring with unnamed grain-futures commission merchants to conceal his operations on their books through false entries and fictitious and dummy accounts. The complaint charged the respondent with failing to report to the Administration on 149 days during 1930 and on 170 days during 1931, on each of which days he was required to report by the law and regulations. The complaint also alleged that the respondent's maximum short position in wheat futures in 1930 was 7,525,000 bushels and his maximum short position in 1931 was 6,770,000 bushels, none of which was reported to the Administration. The complainant further alleged that in 1930, during the time the trader had open commitments that he was concealing, he was short 79 percent of the time, and that in 1931 during the period that he had an open net position concealed he was short 89 percent of the time, that he was short on 493 of the 582 days, during the 2-year period, upon which he had an open net position.

Hearing upon the complaint of the Secretary of Agriculture was held before a referee, at which the respondent was directed to show cause why an order should not be made denying him trading privileges upon all contract markets for such period as specified by the Commission created by the Grain Futures Act; the case was pending at the close of the year.

OPEN COMMITMENTS

The Administration continued the announcement daily during the year of the amount of open commitments (contracts remaining unfulfilled by the delivery of grain or not closed by an offsetting purchase or sale) in each grain future on the books of clearing members of the principal contract markets. The amount of open commitments in each wheat and corn future on the Chicago Board of Trade, at semimonthly intervals, is shown in tables 5 and 6, respectively.

TABLE 5.—Wheat futures: Open commitments in each future on the Chicago Board of Trade, shown semimonthly for the period June 30, 1933, to June 30, 1934 ¹

[In thousands of bushels, i.e., 000 omitted]

Date	Future				
	July	September	December	May	All wheat futures
1933					
June 30.....	5,364	95,707	58,518	4,760	164,349
July 15.....	2,014	95,104	74,203	19,223	190,544
July 31.....		62,692	73,940	30,697	167,329
Aug. 15.....		42,495	83,495	37,087	163,077
Aug. 31.....		5,721	93,512	50,625	149,858
Sept. 15.....		737	91,916	58,599	151,252
Sept. 30.....			86,733	70,880	157,613
Oct. 14.....	2,636		77,672	72,942	153,250
Oct. 31.....	6,736		56,209	74,408	137,353
Nov. 15.....	9,491		40,161	92,542	142,194
Nov. 29.....	16,870		9,460	111,432	137,762
Dec. 15.....	21,192		1,575	114,976	137,743
Dec. 30.....	24,528			108,809	133,337
1934					
Jan. 15.....	26,159	1,252		101,486	128,897
Jan. 31.....	27,275	4,013		102,789	134,077
Feb. 15.....	29,707	6,506		94,913	131,126
Feb. 28.....	30,260	8,242	5	87,435	125,942
Mar. 15.....	33,090	12,058	5	75,347	120,500
Mar. 31.....	36,067	14,649	5	64,995	115,716
Apr. 14.....	41,173	21,294	5	51,423	113,895
Apr. 30.....	46,538	36,323	30	12,944	95,835
May 15.....	44,521	39,843	141	5,250	89,755
May 31.....	37,548	53,217	341		91,106
June 15.....	23,264	69,442	9,861		102,567
June 30.....	9,636	84,061	23,300		116,997

¹ The maximum open commitments in all wheat futures was 199,711,000 bushels, on July 19, 1933. The minimum was 88,669,000 bushels, on May 10, 1934.

TABLE 6.—Corn futures: Open commitments in each future on the Chicago Board of Trade, shown semimonthly for the period June 30, 1933, to June 30, 1934 ¹

[In thousands of bushels, i.e., 000 omitted]

Date	Future				
	July	September	December	May	All corn futures
1933					
June 30.....	3,911	49,780	36,666	32	90,389
July 15.....	1,135	54,439	53,052	6,005	114,631
July 31.....		33,160	53,360	11,171	97,691
Aug. 15.....		26,600	55,786	13,187	95,573
Aug. 31.....		6,884	63,928	18,848	89,660
Sept. 15.....		470	66,799	24,332	91,601
Sept. 30.....			66,172	30,457	96,629
Oct. 14.....	1,379		55,617	40,265	97,261
Oct. 31.....	3,730		48,074	46,876	98,680
Nov. 15.....	5,022		39,252	55,625	99,899
Nov. 29.....	7,933		8,792	79,694	96,419
Dec. 15.....	11,755		162	89,178	101,095
Dec. 30.....	15,405			85,546	100,951
1934					
Jan. 15.....	16,582	456		82,806	99,844
Jan. 31.....	17,486	908		82,214	100,608
Feb. 15.....	20,591	1,760		78,528	100,879
Feb. 28.....	21,558	2,099		74,182	97,839
Mar. 15.....	23,849	2,551		70,524	96,924
Mar. 31.....	26,699	3,422		63,511	93,632
Apr. 14.....	31,046	7,609		48,888	97,443
Apr. 30.....	43,435	20,998		11,033	75,466
May 15.....	42,970	23,121		520	66,611
May 31.....	34,271	29,730			64,001
June 15.....	19,818	37,967	3,588		61,373
June 30.....	6,364	46,175	8,878		61,417

¹ The maximum open commitments in all corn futures was 120,172,000 bushels, on July 19, 1933. The minimum was 59,652,000 bushels, on June 23, 1934.

DELIVERIES ON FUTURES CONTRACTS

The volume of trading during the life of each principal grain future on the Chicago Board of Trade expiring during the past year, the maximum open commitments therein, the amount of open commitments at the beginning of the respective delivery months, the volume of contracts fulfilled by delivery of grain, their percentage of the total sales, and the total quantity of actual grain delivered on such contracts are shown in table 7.

TABLE 7.—*Volume of trading (sales) during the life of each principal grain future on the Chicago Board of Trade expiring during the fiscal year ended June 30, 1934; maximum open commitments in each future, open commitments in each future at beginning of delivery month, futures contracts settled by delivery of grain, and total quantity of actual grain delivered*

[In thousands of bushels; i. e., 000 omitted]

Future	Volume of trading during life of future (sales)	Maximum open commitments during life of future	Open commitments at beginning of delivery month	Futures contracts settled by delivery		Total quantity of actual grain delivered
				Volume	Percent of total sales	
Wheat:						
1933 July.....	1,993,492	65,662	5,364	2,442	0.12	1,820
1933 September.....	3,125,618	106,082	5,721	4,448	.14	1,807
1933 December.....	2,362,099	96,215	9,460	4,457	.19	1,233
1934 May.....	2,847,799	115,715	12,944	2,452	.09	1,360
Corn:						
1933 July.....	668,386	38,581	3,911	3,249	.49	2,012
1933 September.....	973,012	55,926	6,884	7,416	.76	3,704
1933 December.....	1,093,736	67,731	8,792	9,130	.83	3,248
1934 May.....	947,117	90,109	11,033	12,207	1.29	3,702
Oats:						
1933 July.....	55,857	8,657	2,896	1,089	1.95	890
1933 September.....	326,073	24,999	2,425	1,328	.41	368
1933 December.....	415,861	38,994	4,910	2,141	.51	486
1934 May.....	442,412	54,187	7,025	2,851	.64	331
Rye:						
1933 July.....	43,187	7,396	2,668	4,124	9.55	2,708
1933 September.....	101,092	8,284	1,608	2,208	2.18	1,462
1933 December.....	165,968	13,223	2,925	2,387	1.44	1,057
1934 May.....	134,381	18,034	2,355	1,668	1.24	923
Barley:						
1933 July.....	6,429	993	104	122	1.90	93
1933 September.....	22,231	2,733	366	337	1.52	204
1933 December.....	26,334	4,062	358	519	1.97	204
1934 May.....	11,961	2,549	745	565	4.72	370

MODIFICATION OF REPORTING REQUIREMENT

The requirement that the individual open commitments in grain futures of large operators be reported daily to the Administration, which requirement (suspended effective Oct. 24, 1932) was reinstated as of July 20, 1933, was modified October 14, 1933. The modification effected a reduction of the minimum amount of an individual trader's open commitments required to be reported from 500,000 bushels in any wheat, corn, or oats future on the Chicago Board of Trade to 200,000 bushels. The 200,000-bushel minimum reporting requirement previously in effect with respect to Chicago rye and barley futures was left unchanged. The minimum individual open commitments in any Minneapolis, Kansas City, or Duluth grain future required to be reported daily was reduced to 100,000 bushels, excepting that with respect to Minneapolis and Duluth flax futures the 50,000-bushel minimum previously fixed was left unchanged.

This reporting requirement always has been regarded by the Administration as vital to the effective and economical administration of the Grain Futures Act in that by means of the daily reports the Administration is apprised of the market positions of the large operators and is enabled, so far as is possible under the act, to take appropriate steps to prevent the development of dangerous market situations. The lowering of the minimum reporting limit has substantially increased the information currently collected by the Administration relative to the market positions of the larger traders.

PRIVILEGE TRADING

The manuscript by Paul Mehl (when printed, to be designated Circular No. 323) presenting the results of a comprehensive study of trading in privileges in grain futures (known also as "indemnities", "puts and calls", and "bids and offers"), as conducted on the Chicago Board of Trade at intermittent periods from the early sixties until suspended by the board July 24, 1933, was completed and sent to the printer during the year. A privilege in grain futures is an agreement whereby the buyer of the privilege acquires the option to sell to or purchase from the seller of the privilege during a specified period a stipulated quantity of grain futures at a price designated in the agreement. Privileges have been used extensively by large speculative operators to get into and out of the market, and to change their market positions, without the necessity of having their transactions in grain futures executed in the usual manner in the grain pits. It is believed that this is the only comprehensive study ever made of the extent of trading in privileges, the purposes for which employed by merchandisers of grain and by speculators, the frequency with which they were exercisable at a profit to purchasers, and their economic value.

REPORT OF THE CHIEF OF THE BUREAU OF HOME ECONOMICS, 1934

UNITED STATES DEPARTMENT OF AGRICULTURE,
BUREAU OF HOME ECONOMICS,
Washington, D.C., August 31, 1934.

SIR: I present herewith the report of the Bureau of Home Economics for the fiscal year ended June 30, 1934.

LOUISE STANLEY, *Chief.*

HON. HENRY A. WALLACE,
Secretary of Agriculture.

While carrying out its regular program, the Bureau of Home Economics during the fiscal year just passed directed its activities also to meet, so far as possible, the demands upon the staff for assistance to the emergency and recovery agencies of the Government. The background of factual data resulting from our basic research program made the Bureau an important source of information on consumer problems, on emergency food relief and other relief measures, on nutritive values of diets at different levels of cost, on costs and standards of living, family budgets, and housing and household equipment for both farm and city families. To the extent permitted by its limited personnel, the Bureau has handled many of these emergency problems in addition to its regular work. Of major importance among the new projects were the following:

A study of farm-housing conditions, carried out under a grant of Civil Works Administration funds. This study was directed by the Bureau of Home Economics in cooperation with the Bureau of Agricultural Engineering and other units of the Department.

A study of the cost of living of employees of the United States Government in the District of Columbia, made jointly by the United States Bureau of Labor Statistics and the Bureau of Home Economics.

Revision of commodity lists and specifications for reporting retail prices. In this the Bureau assisted the Interdepartmental Committee on Retail Prices of the Central Statistical Board.

Publication of consumers' guides for household buying, at the request of the National Emergency Council.

Preparation of suggestions for meals for children, for use especially in nursery schools and school lunches provided under the Federal Emergency Relief Administration program.

Planning of a large-scale study of the consumption of farm and industrial products at different income levels.

In view of the interest of various Government agencies in the wider use of electrical household equipment, the studies in this field were expanded somewhat. A bibliography on studies of electric ranges and material on types of ranges available were prepared. We have cooperated with the Electric Farm and Home Authority in the study of the ranges and refrigerators offered for sale under that Authority and have developed laboratories and test methods for measuring the efficiency of both refrigerators and stoves.

FARM-HOUSING SURVEY

As a feature of the recovery program, for which funds were provided by the Civil Works Administration, a farm-housing survey was made by the Bureaus of Home Economics and Agricultural Engineering. The inconvenience of farm-

houses, the scarcity of comforts that are taken as a matter of course in the city, and the widespread lack of even simple facilities for safeguarding health are well-known facts about rural housing. Years of economic depression have, of course, intensified these conditions and tended to lower the standard of living among farm people. Parallel to this social side of the rural-housing situation is the well-recognized economic principle that money spent in improving the farm home tends to increase employment in the building industries and that the wages of industrial workers eventually come back to the farmer in better prices for his products.

With these two points of view in mind, a survey was made of farmhouses representative of conditions the country over. The purposes were: (1) To obtain definite facts and figures on rural-housing needs from the men and women occupants; (2) to work out plans and specifications for building new low-cost rural houses, and for making repairs and improvements on houses now standing; and (3) to suggest methods of financing that would aid in rural improvement and national economic recovery.

The field staff visited over 600,000 farm homes in 352 counties in 46 States and obtained definite facts on some 300 items touching on the structure of the house, water supply, and sewage disposal, light and heat, refrigeration, laundry, and cooking facilities, and so on down to pertinent questions on new installations and construction and acceptable methods of financing. Following up the initial survey, an engineer in each county visited certain selected houses and obtained more detailed data on needed repairs and then worked up a schedule of unit costs after interviewing local dealers, contractors, and farmers.

The survey so far indicates that probably 50 percent of our rural homes are in good structural condition. They may be poorly arranged, and most of them lack modern conveniences, but at least the houses are reasonably sound. This speaks well both for those who built them and for the owners who have taken care of them during these lean years. On the other hand, some 15 percent of the houses need replacement of foundations; between 15 and 20 percent, replacement of roofs; 10 to 15 percent, replacement of floors; about 10 percent, extensive repairs or replacement of exterior walls. Between the extremes of houses in good condition and those needing complete replacement of some part or all of the house is a large group needing extensive repairs of some kind, including much interior refinishing and replacement of exterior paint.

A summary of the survey reports shows that 250,000 farmers hope to build new houses within the next 3 years and that a much larger number wish to remodel their houses and add more conveniences when their incomes permit. In order to assist farm people in planning their improvements the Bureaus of Home Economics and Agricultural Engineering cooperated with 20 of the State agricultural colleges and the Civil Works Administration in preparing designs for well-arranged low-cost farmhouses. Forty of these plans are being published in a farmer's bulletin on Farmhouse Plans, and working drawings to be used by carpenters in building these houses are available through the extension services of the State agricultural colleges. Studies were made of kitchen arrangement, storage units, and farmhouse remodeling. Educational material is being prepared to show suggestions for all kinds of remodeling of old houses and for making the most needed repairs. Specifications were prepared for plumbing and heating equipment suitable for farm use. The survey stimulated a renewed interest in home improvement, and there is an increasing demand for material on all phases of this subject.

Since the housing survey showed that a large number of farm people wish to obtain electric service, a detailed study was made in selected areas of present electric-service facilities and desirable extensions both of transmission lines and of uses for electricity on farms. Other special phases of the survey obtained information on rural hospital and library facilities. Thus the farm-housing survey furnished much basic information needed in planning for improved living conditions on farms.

As an immediate relief measure the project gave employment to nearly 5,000 persons, about 4,500 of them women seriously in need of jobs. The personnel included women trained in home economics, agricultural engineers and architects, as well as workers with statistical, clerical, and field experience. The entire project was organized and carried out under the direction of the Bureau of Home Economics.

ECONOMIC STUDIES

COST OF LIVING OF FEDERAL EMPLOYEES

Upon the recommendation of the Committee on Government Statistics and Information Services, the staff of the Economics Division cooperated with the Bureau of Labor Statistics in the preparation of index figures of changes in the cost of living of Federal employees from 1928 to 1933. This information was requested by the President as a basis for determining salary reductions required by the Economy Act of 1933. Since it was impossible in the time available to investigate the costs of living of all Government employees throughout the Nation, a study was made of Federal employees living in Washington, D.C. Detailed information was obtained on the expenditures of six groups of employees, representing different salary levels, different family composition, and different types of living arrangements. Complete figures on disbursements for all kinds of goods and services for the year 1932-33, and more limited data for 1927-28, were secured from 366 Federal employees living in family groups and from 123 employees living as single individuals. Further material on expenditures for certain specified items in the first 6 months of 1928 was collected from a larger number of employees. On the basis of these data, consumption weights for the more important items of expenditure were established, 252 commodities and services being included in the list. By applying retail prices obtained in Washington stores to these weighted items, the costs of living for the 1928 base period and for March and December of 1933 were calculated, and the index of changes in cost of living computed.

Two preliminary reports of this investigation have been published, and a more detailed publication is in preparation. This further publication will present the average quantities and costs of the various goods and services purchased by each group of employees studied, and will indicate the methods used in computing the indexes of living costs.

RETAIL-PRICE REPORTING

The retail prices used in computing these cost-of-living indexes for Federal employees were collected in cooperation with the Interdepartmental Committee on Retail Prices of the Central Statistical Board and with the retail price reporting project of the Civil Works Administration sponsored by the committee and by the Bureau of Labor Statistics. The chief of the Division has served as a member of this interdepartmental committee, and the entire staff has assisted in preparing the material needed as a basis for a more adequate retail price-reporting service within the Government. This work has included the compilation of lists of various foods, articles of clothing, and other commodities for which retail prices should be available (the list heretofore covered by retail-price statistics being revised and greatly expanded), and the preparation of a brief descriptive specification for each commodity whereby price reporters in different towns and cities can identify clearly the kind and cost of the merchandise priced. Members of the Division have also assisted in collecting prices on these commodities in Washington department stores and specialty shops on several different dates, with the dual purpose of testing and revising the lists and specifications and of obtaining prices for the computation of the cost-of-living indexes for Federal employees.

CONSUMPTION HABITS

Work has proceeded during the year, within the limits of the staff available, on a summary of existing information on food-consumption habits of the population of the United States at different levels of expenditure and on the cost and adequacy of American diets, as shown by the existing dietary studies of rural and urban families. This project is particularly significant and timely in connection with the work of the Program Planning Division of the Agricultural Adjustment Administration. Recognizing this fact, the A.A.A. has detailed 395 days of clerical assistance to expedite certain phases of this work.

Time has also been given to planning a large-scale study of the consumption of farm and industrial products at different income levels in different types of communities and regions. The information which such an investigation

would furnish is urgently needed in connection with the recovery program and with the long-time programs of various governmental agencies, as a basis for planning production and distribution, for adjusting wages and purchasing power, for measuring changes in cost of living, for formulating programs of consumer education, and for improving living conditions in certain areas. The existing information on the consumption habits of the population is totally inadequate for these present purposes, as it covers only a small proportion of American families, and is in large part now obsolete. Although funds have not been made available for a comprehensive investigation of consumer expenditures, contacts have been made with several States for cooperative studies of selected groups of families, and it is planned to begin the initial studies within the next few months. The plans for this investigation have been made in consultation with the Bureau of Labor Statistics and other governmental agencies interested in this field of research, so that the work may be coordinated with the studies of other agencies and the results made of maximum usefulness. In connection with the coordination of governmental activities in this field, a member of the staff has served as chairman of a subcommittee on consumption and cost of living studies appointed by the Committee on Statistical Programs of the Central Statistical Board.

ANALYSIS OF FAMILY-LIVING STUDIES

With the cooperation of the Social Science Research Council, Harvard University, and the Institute of Pacific Relations, a report has been prepared on *Studies of Family Living in the United States and Other Countries: An Analysis of Material and Method*. This publication will serve as a valuable source book on existing information on consumption, standards of living, and living costs, and will provide research workers undertaking new studies in this field with an evaluation of the technics used in collecting and analyzing data. Brief abstracts are presented of 465 studies of family living made in the United States and Canada, and of more than 1,100 studies made in other countries. These annotations are preceded by introductory chapters summarizing the history of studies in this and other countries and evaluating the methods used in studies made by the Le Play school and by the statistical schools. An index to materials and to methods, as well as an author index, will enable the student to locate readily the material in which he is interested. Carle C. Zimmerman, of Harvard University, is a joint author of the report. He prepared the material dealing with studies made in countries other than the United States and Canada. Two preliminary reports of the annotated bibliographical section were published earlier in mimeographed form.

FOOD BUDGETS

The food budgets at 4 levels of nutritive value and cost, mentioned in last year's annual report, came from the press in November and December 1933 in the form of 2 publications, Circular 296, *Diets at Four Levels of Nutritive Content and Cost*, and Miscellaneous Publication 183, *Food Budgets for Nutrition and Production Programs*. These publications have had wide circulation, and the material has been put to many uses. Social agencies, particularly relief workers, have used the data as a basis for determining food allowances for individual families and institutional groups. Teachers have used it as an aid in nutrition instruction. The Extension Service has used it in helping to guide home food-production programs of family groups and in planning cooperative living for groups of college students. In addition, these publications have had wide circulation among economists who are interested in raising the level of living in this country. Popular interpretations are now being prepared which will adapt this material to the situations faced by the city family and the rural family.

To give help on the child-feeding problems created by the establishment of nursery schools and the provision of school lunches under the program of the Federal Emergency Relief Administration, two mimeographed publications were prepared in this Division: (1) *Noon Meals for Nursery Schools*, and (2) *School Lunches, with Recipes to Serve 50 Children*. The material for preschool children was based largely on the Bureau's experience at the National Child Research Center. The school-lunch suggestions were prepared in cooperation with the Food Utilization Section of the Bureau.

At the request of the Federal Emergency Relief Administration, the full-time services of one member of our staff was loaned for 2 months to the Federal Surplus Foods Corporation to assist in the allocation of surplus commodities to the various States.

CONSUMER PURCHASING

Besides cooperating with the Division of Textiles and Clothing in preparing Miscellaneous Publication 193, Present Guides for Household Buying, discussed under another heading, the Economics Division has been able to assist in furthering the interests of consumers through the services of a member of the staff acting as chairman of the Committee of the American Home Economics Association on Standardization of Consumers' Goods, and as representative of that organization on the council of the American Standards Association. She has also been chairman of the Committee on Consumers' Interests of the American Association of University Women.

Much time has necessarily been given by all members of the staff to meeting innumerable requests from individual homemakers throughout the country for help in spending the family income and in adjusting housekeeping practices to meet the depression. Similar requests come daily from relief agencies, teachers, extension workers, and other groups. Considerable time has also been given to preparing material on minimum family budgets and on consumer expenditures at the request of governmental agencies concerned with various aspects of the recovery program.

FOODS AND NUTRITION

The planning program of the Agricultural Adjustment Administration focused attention as never before on the nutritive value of foodstuffs and different types of food products. At the same time the food-distribution programs of emergency relief agencies offer an unparalleled opportunity to make available to a large group of our population not only more nutritious foods but some knowledge of their nutritive value and best uses. This has developed an unprecedented demand for information from the Bureau's food composition, nutrition, and food-utilization sections.

FOOD COMPOSITION

The scientific data assembled and analyzed by this section of the Bureau provide very necessary information for evaluating the national food supply or planning changes in production, processing, or distribution of food commodities. Information as to the composition and nutritive value of competing agricultural products has been furnished to the A.A.A., and similar service with regard to food supplies has been rendered to Federal and State relief agencies and to the Civilian Conservation Corps.

Such demands were given precedence over the usual program of this section, but two new projects were undertaken, and the regular work of collecting and analyzing food-composition data was continued.

A survey of available information on the mineral content of foods produced under known conditions has disclosed the need for a comprehensive study of the distribution of calcium, phosphorus, iron, and copper in food materials. A cooperative plan for such work has therefore been formulated, and as a result, new work is being undertaken in various States in universities and experiment stations. The Bureau is serving as a coordinating agency in this enterprise.

In response to the need for a uniform system of grouping foods with regard to their carbohydrate content, this section of the Bureau, in cooperation with the American Dietetics Association, has prepared a new classification of fruits and vegetables. This classification, which will reduce the errors in computing diabetic and other special diets, is being tried out in tentative form in hospital practice. A paper on the subject is being prepared for publication.

NUTRITION STUDIES

The popularization of the newer knowledge of nutrition has caused shifts in consumer demand for the different groups of foods. If this changing demand is to be guided so as to be of greatest use to both consumer and producer, we need to know more about the vitamin content of foods and more about the

minerals they contain. But we must also know the effect of production and handling methods on the nutritive value of the food, and the optimum requirement for these nutrients in the human diet.

Since the staff of the nutrition section is small, the laboratory work to date has been directed toward obtaining data on the vitamin content of different foods, and to a study of the nutritional significance of minerals that occur regularly in foods but only in minute amounts. Those studies are important from the standpoint of supplying data needed by the dietitian for planning everyday meals. They are equally important in the planning of production programs, if the new knowledge which scientists have gained about food values is to be applied in the improvement of the national food supply. The vitamin studies are continuously bringing out the importance of the so-called "protective foods", milk, fruits, and vegetables.

In addition to the laboratory analyses of foods for their vitamin content, there is need for studies to determine the vitamin requirement for different age groups, different degrees of activity, and for different physiological conditions, such as growth, pregnancy, and old age.

VITAMIN VALUES

This section, in cooperation with the Office of Experiment Stations, is collecting, analyzing, and tabulating all available data on the vitamin values of the common foods.

Laboratory studies were made of the vitamin A content of eggs in relation to the diet of the hen. Previous studies showed that the vitamin D content of hen eggs can be increased by adding viosterol to the hen's food, and the present study was made to determine, similarly, the relation between the vitamin A content of the hen's diet and the storage of this vitamin in the egg, and also the influence, if any, of viosterol on the storage of vitamin A in the egg. Cod-liver oil was used to supply the vitamin A. The experiments show that the vitamin A content of the eggs was proportional to the cod-liver oil content of the diet, irrespective of the amount of viosterol used.

Liver is a most important food product because it is such an excellent source of many nutritive essentials. It is known to be rich in vitamins A and G and a good source of vitamin B. It also contains iron and the anti-anemic principle. Little has been known, however, about its vitamin D content.

In the Bureau's nutrition laboratory four kinds of liver were tested for vitamin D and beef and pig liver were found to be about equal in potency. Both may be considered fair sources of vitamin D. Sheep liver had less of this vitamin than either beef or pig liver, but was apparently richer than calf liver.

MINERAL VALUES

Selenium is found in varying amounts in food products grown in certain types of soil. To determine its effects the Bureau is experimenting with small quantities in the diet of the rat. Preliminary tests were made to determine the rate of storage in the different organs. These tests were paralleled with others to determine the rate of elimination after the animals were returned to a diet containing no selenium. The storage of selenium in the different organs does not seem to be cumulative. All of it was apparently eliminated when the animals were returned to a normal diet, although the lesions that developed during the time selenium was being ingested did not heal.

A study of the minerals in eggs from hens fed on a mixed diet was made by means of a Littrow-type spectrograph. Eighteen elements were definitely identified, and five others were noted as probably present.

Sesame seed, which is grown to an increasing extent in the Southwest, is rich in calcium. Since the most common dietary deficiency in this country is calcium, tests were made to determine whether the calcium of sesame seed is in a form utilizable as food. Preliminary tests were affirmative. Rats fed on a calcium-poor diet supplemented with sesame seed showed no pathological evidence of calcium deficiency, indicating that they were able to make use of the calcium in the sesame seed.

Material for a set of lantern slides entitled "Selecting Foods for Good Nutrition" was prepared in cooperation with the Economics Division. Illustrations of animals showing mineral and vitamin deficiencies were included

as well as photographs of foods that should be used to supply the various essential nutrients.

The nutrition charts previously published have been completely revised, and the new series, to consist of 11 charts instead of 9 as formerly, will soon be available.

FOOD UTILIZATION

This section has assisted the Federal Emergency Relief Administration and other agencies by providing directions for advantageous use of foods distributed by the Federal Surplus Relief Corporation; by suggestions to housewives on the preparation of low-cost foods; by preparing quantity recipes for use in school lunches and at transient relief centers; by cooperative studies with the dried-milk industry to work out a formula for increasing the milk solids in the diets of young children; and by special experiments to develop emergency methods of canning beef, veal, and mutton in the drought areas.

These emergency undertakings were carried out in addition to the regular program of research and experimentation in this section.

MEAT CANNING

Three methods of precooking beef for canning were studied, namely, exhausting raw meat in cans in a water bath, exhausting raw meat in cans in the oven, and pot-roasting the meat before placing it in the cans. Examination of the canned meat after 6 months of storage showed little difference in flavor or other qualities of the meat exhausted in the can, but the pot roast was significantly less desirable in flavor than the meat prepared by the other two methods.

In answer to requests for a greater variety of canned-meat products, formulas were developed for canning beef in the form of stews, goulash, steak, steak and onions, and meat loaf. Unless, however, there is some special reason for having a ready-to-serve mixture, the Bureau recommends canning the meat alone, with no seasoning except salt, with no vegetables, and with no gravy other than unthickened meat juice or broth. It can be used in any desired mixtures after the can is opened, and the dish is better flavored when the foods are freshly mixed.

Beef tongue, brains, kidneys, liver, heart, and sweetbreads from veal were also canned successfully. But it is recommended that these parts, with the exception of beef tongue, be canned only when they cannot be used economically while fresh.

A series of tests were made to find methods of handling that would prevent the loss of liquid from glass jars in pressure cookers during processing under pressure, a difficulty not entirely overcome in any of the methods usually recommended. Jars of the automatic or self-sealing type lose less liquid than the screw-top or wire-bail types. However, the self-sealing jars require special protection from drafts after being processed, or they may explode. This difficulty is lessened by leaving 1 inch of head space in these jars, or filling the jars only to the collar.

EGGS

Because of market discrimination against so-called thin egg white, studies were made in this section comparing the behavior and chemical factors in whole white, and thick and thin white separated mechanically. Since egg white is important as a means of adding air, the volume and stability of the egg foam were measured, and practical tests were made with angel cake.

In all samples of egg white tested, the foam reached maximum stability after 75 to 90 seconds of beating with the second speed of a power egg beater, and the egg white at a temperature of 77°F. With this time of beating the thin whites yielded the largest foam volume, but the foam from thick whites was more stable than that from the thin whites regardless of the time of beating, which ranged from one-half to 4 minutes.

A comparison of the quality of angel cake from whole egg white and separated thick and thin egg white, correlated with the total solids in each case, indicated that with total solids of 12 percent, which is the normal value, whole egg whites and thick egg whites produce a lighter and more tender cake than the thin whites. Dilution of the whole and the thick whites with water increased the compressibility or softness of the cake. With the thin whites the

cake was heavier and less tender. With 10 percent of total solids the three types of whites gave almost identical results for lightness, softness, and tenderness. The study indicates that the best angel cakes can be made from undiluted egg white, although satisfactory cakes can be made with not over 10 percent of water added to the white.

FATS

Animal and vegetable fats were compared in a series of tests to determine whether a difference in temperature is required to yield the most satisfactory results in deep-fat frying. Doughnuts cooked in a prime steam lard and a hydrogenated cottonseed oil at three temperatures (365°, 383°, and 392° F.) showed no significant difference in quality.

A further comparison of fats in frying was made with potato chips. The fats used were three kettle-rendered lards produced by the Bureau of Animal Industry at Beltsville, Md., from animals fed respectively a peanut, corn, and brewer's rice ration, and a representative sample each of prime steam lard, hydrogenated lard, hydrogenated cottonseed oil, and highly refined corn oil, cottonseed oil, and peanut oil. The potatoes were of the Green Mountain variety harvested by the Bureau of Plant Industry at Presque Isle, Maine. The chips resulting from repeated fryings in each fat showed little variation except in luster and flavor.

Cottonseed oil, peanut oil, lard from peanut-fed hogs, and corn oil gave a high luster to the chips. Hydrogenated cottonseed oil and prime steam lard gave a medium luster, while hydrogenated lard from corn-fed and rice-fed hogs gave a significantly duller luster than the other fats.

Peanut oil and corn oil gave the most desirable flavor to the potato chips but these two flavors were not significantly different from each other. All the vegetable fats tested gave a more desirable flavor to the potato chips than the lards.

Peanut oil gave the best general results in frying potato chips, although the difference between it and the other vegetable oils was not important. Corn oil, cottonseed oil, and hydrogenated cottonseed oil were found to be about equally desirable as a frying medium for potato chips. Lard from peanut-fed hogs and hydrogenated lard were next in desirability. Lard from corn-fed and rice-fed hogs and prime steam lard ranked together, but were less desirable than the other fats for this use.

The amount of fat absorbed by the potato chips fried in the various fats was not significantly different.

Storage tests showed that potato chips fried in any of these fats while fresh and stored in white glassine bags at room temperature did not develop rancidity up to 25 days.

During 8½ hours of frying the lards developed about 0.2 percent of free acid calculated as oleic acid above that initially present. The vegetable fats developed about 0.1 percent. The iodine numbers of all the fats decreased during frying. The decrease was rather uniform, ranging from 3 to 5 iodine-number units. The peroxide values of the fats after the last frying approached those of fats beginning to show rancidity in odor or taste. From the first to the last frying, as shown by the judgments on the chips from each successive frying, there was no significant difference in the rate of deterioration of the fats.

Samples of prime steam, dry-rendered, and kettle-rendered lard, together with a hydrogenated lard, a hydrogenated cottonseed oil, and a compound made from oleostearin and cottonseed oil, were used in studies of fat flavor. Hot biscuits were used as the medium for measuring the intensity and desirability of flavor and of aroma of these fats. Analysis of the data showed that the fats with the least aroma and flavor were most acceptable for use in biscuits. These were kettle-rendered lard, hydrogenated lard, and hydrogenated cottonseed oil.

MEAT

In cooperation with the Bureaus of Animal Industry and Agricultural Economics and State experiment stations, the study of meat quality has been continued. The work of the past year included the cooking of about 500 cuts of meat from experimental animals for palatability tests, continuation of experiments to determine the effect of roasting temperature on the shrinkage and quality of meat, a start in the preparation of a technical bulletin on the

shrinkage of beef, the publication of a technical bulletin on the shrinkage of lamb and mutton, and the publication of popular educational material on meat cookery.

Technical Bulletin No. 440, Shrinkage (loss of weight) and Heat Penetration During the Roasting of Lamb and Mutton as Influenced by Carcass Grade, Ripening Period, and Cooking Method, analyzes the data from 1,185 legs of lamb and mutton, ranging in grade from Choice to Cull, ranging in ripening period from 2 to 24 days after slaughter, and roasted by seven different methods. The bulletin brings out the following general points:

The higher the grade of lamb and mutton the greater was the shrinkage during cooking, due mainly to the rendering out of more fat into the pan drippings from the better finished high-grade meat. Choice, Good, and Medium grade legs of lamb cooked more rapidly in proportion to their weight than lamb of Common and Cull grades.

As the ripening period increased beyond 2 days after slaughter the cooking shrinkage became less, offsetting some of the loss of weight in the cooler during storage. The rate of heat penetration became more rapid, suggesting that there would probably be less fuel required per pound of meat cooked as the ripening progressed.

For lamb roasted medium to well done (169° F. on a meat thermometer in the thickest part of the leg), the lower the oven temperature the less was the shrinkage. But for lamb roasted to the well-done stage (181° F.) there was no saving in shrinkage through the use of low oven temperatures because of the long time required. The stage to which leg of lamb was cooked, whether to 169° or to 181° F., made more difference in shrinkage than the range of 90° between 257° and 347° F. oven temperature. These results bring out an important point in meat cookery with respect to controlling the shrinkage and also furnish a good argument for the use of a roast-meat thermometer in addition to an oven thermometer. The meat thermometer shows when the desired stage of doneness is reached and prevents overcooking and excessive shrinkage.

As educational material on meat cookery, the series of 50 lantern slides entitled "Cooking Meat According to the Cut", which was a feature of the Bureau of Home Economics meat exhibit at A Century of Progress in Chicago during the summer of 1933, is now available as a film strip, in black and white, with accompanying lecture notes. A set of seven meat-cooking charts, 20 by 30 inches in size and printed in black and white on heavy coated paper has been published. These charts contain some of the same photographs used in the film-strip series and illustrate the principles of roasting and broiling tender cuts, stuffing and cooking low-cost tender roasts, braising less-tender cuts, and preparing ground meat in savory ways.

POTATOES

In continuation of the quality study of potatoes undertaken in cooperation with the Bureau of Plant Industry, samples of three varieties of potatoes—Chippewa, Green Mountain, and Russet Burbank—grown in 24 locations, were studied to ascertain whether variability due to widely varying conditions of environment was greater for one variety than for another. The quality of Chippewa was found to fall into three grades and that of Green Mountain and Russet Burbank into four grades, showing a wide range of cooking quality for all three varieties. From the data it was evident, however, that the cooking quality of the Chippewa was consistently poorer than that of the Green Mountain and Russet Burbank.

For purposes of selection for breeding studies, about 50 seedling varieties of potatoes were cooked and judged for quality.

SOYBEANS

Thirteen varieties of soybeans, native to Chosen and Japan, grown at the Arlington Experimental Farm and at several experiment stations throughout the United States, were judged for quality as a green bean in the Home Economics laboratories in cooperation with the growers. Comparison of the data from the different laboratories shows that environment made a vast difference in the quality of the soybeans. Some grown in one locality and found to be the best there were the poorest when grown in a different locality. Several

of the varieties, especially the Hahto, Rokuson, Cha mame, Higan mame, and Easy Cook, made a very desirable green vegetable, having a mealy texture, a sweet, nutty flavor, and a short cooking period.

RICE

Cooking and soup-canning tests were made on a number of samples of rice sent in from some of the different localities in the Southern States, also on one from Dutch Guiana, South America. None of the samples was found to equal Patna either as boiled rice or in soup.

TEXTILES AND CLOTHING

To meet the demands for emergency service during the year, the Textiles and Clothing Division, with its limited staff, reduced its regular work as much as could be done without loss of costly experimental material produced over a period of years in connection with long-time projects. These emergency services included assistance in work on consumers' standards; in the compilation of lists of textiles and clothing, together with the specifications, for use in a Government survey of retail prices; in studying market shifts of competing textile products; in the preparation of instructions for use in work-relief projects; and the assembling of available guides for household buying.

The chief of the Division was appointed a consultant on the Consumers Advisory Board of the National Recovery Administration and has served in that capacity throughout the year. She has assisted in the preparation of briefs presented by the board at code hearings, advised concerning code provisions to be requested by the board in order to afford greater consumer protection, and assisted with reports issued to the public by the board on the need of standards for consumer goods.

The Division cooperated in the work of listing textile commodities to be used by the Committee on Retail Prices of the Central Statistical Board as a basis for a price survey of the United States, and prepared specifications for the clothing and household items on this list. Almost the entire staff of the Division was assigned to this work for a time to accumulate the necessary data, and two members worked with the committee in formulating the final recommendations.

A member of the Division worked on the linen and silk-rayon subcommittees which were formed by the Cotton Processing and Marketing Section of the Agricultural Adjustment Administration to study shifts from cotton to other fibers resulting from a processing tax imposed upon cotton as proposed by section 15-d of the Agricultural Adjustment Act.

The Division has supplied instructions to the Federal Emergency Relief Administration for making cotton mattresses, cotton bed comforters, quilts, sheets, pillowcases, and towels. These have been used as a basis for the workroom regulations issued by that organization. Two members of the staff, together with a representative of the Bureau of Agricultural Economics, wrote specifications for the ticking, toweling, and other fabrics needed for these articles. These specifications were used in purchasing the large quantities of fabrics distributed by the Federal Emergency Relief Administration throughout the country for relief purposes. A suggested list of patterns and sizes needed for the small-factory production of clothing was also prepared for the Relief Administration, as well as specifications for clothing fabrics, and data on the yardage needed for such garments.

Members of the clothing section of the Division worked with the local representatives of the Administration in selecting, cutting, and making alterations in patterns to be used in the workrooms. About 30 patterns were supplied, together with mounted construction helps for each type of garment. Model garments were provided for a few articles.

At the request of the National Emergency Council, a 31-page bulletin entitled "Present Guides for Household Buying" was prepared by the chief of the Division in collaboration with a member of the staff of the Economics Division. This publication was distributed to the consumers' county councils organized under the National Emergency Council. It summarizes, for the first time, the existing types of consumer guides which are of national significance, such as standards and grades developed by the United States Department of Agriculture, commercial standards promulgated by the National Bureau of Stan-

dards, American standards published by the American Standards Association, and "certification" or "approval" activities of national trade associations in this field. These guides include quality grades now in use for food products, clothing and textiles, household equipment, furnishings, and other commodities. A list of 119 references directs consumers to the source of detailed information concerning each buying guide. The bulletin bears directly on the subject of standards for consumer goods, one of the important consumer needs which have been widely discussed during the past year.

QUALITY GUIDES FOR CONSUMERS

To be able to judge the quality of textile goods, the average purchaser needs specific help. The Bureau has accordingly begun publication of a series of leaflets suggesting points to consider when buying certain articles of clothing or household furnishing. Leaflet 105, *Quality Guides in Buying Ready-Made Dresses*, stresses the qualities of fabrics and dress construction which make for economy in purchasing these garments. The wide range of values now shown on the market make it difficult for the purchaser to find those best suited to her needs and pocketbook. The characteristics of cotton, silk, rayon, and wool fabrics, the type of seams and finishes, and the cut and fit of the dress all contribute to its durability and satisfaction in use. These as found in poor- and good-quality dresses, are discussed in detail. The leaflet is supplemented by a set of charts showing good and bad examples of clothing for children. An analysis of the purchasing information now available to consumers through labels on various types of clothes is another approach which has been made to this problem of wise selection of ready-made clothing.

Leaflet 103, *Quality Guides in Buying Sheets and Pillowcases*, enumerates the characteristics of a good sheet, such as quality in fiber, yarns, thread count, weight, and weave. The length of service to be expected from a sheet, and Federal specifications for both sheets and pillowcases are also discussed.

A similar leaflet on buying household blankets is in preparation. This is based partly on an analysis of 25 blankets purchased on the retail market and analyzed for weave, type and kind of yarn, fiber composition, weight, thickness, thread count, yarn twist, heat transmission, air permeability, fiber-length distribution, bursting strength, and resistance to abrasion. The results of this investigation will be published in a technical periodical. They show the great variation in the properties of blankets now on the market and emphasize the need of labeling with information not only as to size and fiber content, but also as to heat transmission and strength.

HOME SEWING

The present economic situation has focused attention on home sewing as a means of extending the family income. Mimeographed circulars such as *Clothing Economies*, *Supplies and Equipment that Aid Home Sewing*, *Hat Economy*, and *Instructions for Making a Cotton Mattress* have all been issued in response to the demand for assistance along these lines.

Two exhibits were prepared suggesting ways of using to the best advantage typical old garments and used materials. These exhibits have been in constant use by extension and relief agencies and are scheduled several months in advance. In order to assist those to whom the exhibits could not be sent and as a supplement to these exhibits, several duplicate sets of cards were prepared bearing photographs of pattern lay-outs on old garments and of the finished garments, together with special suggestions for making them.

The Division's four regular exhibits, consisting of recommended designs for clothing for infants, creeping babies, and children, have continued to tour the country in response to requests. In addition to the wide variety of organizations that ordinarily use them, training schools for teachers preparing to serve in emergency-relief schools have made use of them during the past year. An increasing number of retail stores are promoting merchandise developed along lines recommended by the Bureau, and these also have made use of the clothing exhibits during the past year.

In cooperation with the National Child Research Center, new designs for children's garments have been developed in this Division, and the patterns are being made by commercial pattern companies. Other designs have been improved. To date 8 cooperating commercial pattern companies are producing patterns for 32 designs developed by this Bureau. Manufacturers of ready-

to-wear garments are readily accepting the principles worked out here and incorporating them in designs which are now to be found in practically all large department stores.

NATURAL DYES

In order to meet the many requests from homemakers and handicraft workers for instructions in the use of vegetable dyes, a mimeographed circular entitled "Home Dyeing with Natural Dyes" has been prepared. This information has found immediate use in Federal and State relief centers where handicraft work is being initiated and encouraged.

As a basis for this publication, wool and cotton fabrics were dyed with all the commonly used natural dyestuffs, and samples of each were tested for their fastness to light and to washing. Although some dyes were found to fade and change quickly, there are also many which have good color fastness. Only those recipes which produced fast colors were included in the publication.

Many of our very common and readily available plants yield satisfactory dyes. Very pleasing colors are obtained from apple bark, oak bark, onion skins, juniper berries, coreopsis flowers, laurel leaves, black walnut hulls, and the wood of the Osage-orange tree. Other materials of interest to handicraft workers, such as fustic, indigo, madder, and cutch, also produce good fast colors.

COTTON-UTILIZATION INVESTIGATIONS

To study the effect of conditions of growth of the cotton on the wearing qualities of the finished cotton goods, sheetings made from nonirrigated, irrigated, and a mixture of the two cottons were put into service in a Washington hotel. Sheets are removed at regular intervals of 25 washes and tested for physical and chemical deterioration.

Up to 50 washes, the deterioration is not appreciably different in the various sections of the sheet. All three sheetings were found to shrink approximately 8 percent in length, and increase approximately 2 percent in width. The most shrinkage occurs with the first wash, but slight shrinkage continues with successive launderings, until after 15 washes it is negligible.

The amount of starch present in the finished fabrics and also the amounts remaining in those washed 1, 3, 5, 10, 25, and 50 times were determined. The first laundering removes a large percentage of the starch; a measurable amount is still present after the twenty-fifth wash, but not after the fiftieth. The ash content for all three of the sheetings increases steadily with service. The copper-number tests on the unbleached fabrics show that the sheeting made from irrigated cotton contains more impurities of a reducing nature than do the other two sheetings.

Ironing studies have been continued to determine the effects of pressure on deterioration of the fabric at different temperatures and under varying periods of still contact. Tests were made with pressures varying from 1 to 4 pounds per square inch, a range which includes the pressures commonly found in household ironers. Special attention was given to pressures from 3.5 to 4 pounds, which are sometimes attained in hand-ironing. When at these higher pressures desized sheeting materials were run through the household ironer on a cool roll with a sliding contact of $2\frac{1}{2}$ seconds, changes in surface reflectance, indicating scorch, were observed at temperatures as low as 411° F. This is fully 63° lower than temperatures producing the same change for pressures from $1\frac{1}{4}$ to $1\frac{1}{2}$ pounds per square inch. Chemical damage also was indicated at temperatures 54 to 63 degrees below the low point with the lower pressure range. It is important to check on the temperature of the roll as well as that of the shoe. When the initial surface temperature of the roll was approximately 248° F., and the pressure high, chemical damage was detected with shoe temperatures as low as 390° F., and changed surface reflectance with temperatures as low as 370° F.

Samples ironed at temperatures at which there was no measurable scorch were examined under the microscope. When more than one layer of fabric, as in hems, were ironed on the revolving roll at the higher pressure, the microscope revealed definite ridges between the indented packing of fibers at the intersections of the warp and filling yarns.

Studies were made with the higher pressures on the household ironer for periods of 1 to 20 seconds. With a contact of 20 seconds, indications of scorch were observed for temperatures between 275° and 284° F. These tests confirmed the greater resistance of the low grade of cotton. Strict Good Ordinary

cotton showed higher resistance than Middling and Good Middling cotton as measured both by copper number and by surface reflectance.

Wherever chemical damage was produced by ironing, the same reducing type of oxidized cellulose was obtained in contrast to that produced by wear and laundering. Additional proof of the presence of this reducing type has been given by the large decrease in the copper number of samples scorched and then boiled in dilute alkali.

That surface layers of scorch have a protective value against additional damage on repeated ironing was apparent from measurements on scorched samples conditioned and reironed at high temperatures and pressures. The hygroscopic moisture content of the scorched samples was found to be less than that of those undamaged by ironing.

The suggestion of sweetpotato starch for use as a finish for cotton fabrics led to comparisons in our laboratory with other starches, such as wheat, corn, rice, dasheen, canna, and potato. The stiffness of four plain-weave cotton materials of different weights, sized with these different starch pastes, was measured on the stiffness-testing apparatus devised in this laboratory. In general, the results show that sweetpotato starch is similar to rice, wheat, and corn starches in stiffening power, most closely resembling rice starch.

WOOL-UTILIZATION INVESTIGATIONS

Study of the relative merits of different wools when made into blankets is being continued. Various grades of new and reworked wool used alone, and blends of good-quality new wool with poor-quality new wool, reworked wool, and mohair are being tested by subjecting them to controlled wear and laundering. An apparatus built for measuring the amount of heat transmitted through a blanket is now used to study the effect of service upon the heat-retaining properties of blankets. With increasing service and as the grade of the wool becomes poorer, the ash content and the methylene blue absorption of the fabrics was found to increase and the sulphur content to decrease.

A method has been developed for measuring damage in wool by means of methylene blue absorption, and a paper describing this method was prepared for publication. The procedure adopted is simple, gives accurate, reproducible results, and can be used on fabrics or raw wool, and on undyed or dyed materials.

The methylene blue absorption of woolen materials was found to increase as they were damaged progressively under controlled conditions. The addition of reworked wool to fabrics raises the absorption materially. A linear relationship was shown to exist between methylene blue absorption and strength measurements. It was also observed that the rate of methylene blue absorption of wool decreases as the absorption value decreases. When the volume of methylene blue is kept constant, the absorption varies with the weight of wool taken for analysis.

INFORMATION DIVISION

The emergency activities of the research divisions were reflected in the output of the Information Division. For example, in the illustrated articles for newspaper syndicate services, dishes for low-cost diets were emphasized, clothing economies pointed out, and scientifically sound methods for canning, both at home and in community centers, explained as economy measures and for health protection. The press release entitled "The Market Basket" was again issued weekly and distributed to newspapers, large relief agencies, and the county home demonstration agents, to give timely suggestions on low-cost meals and interpret the findings of nutrition research for the benefit of homemakers desiring to obtain the most food value for a limited expenditure of money. Special articles on food values, and suggestions on household purchasing, were contributed regularly to the Consumers' Guide, issued by the Consumers' Counsel Division of the Agricultural Adjustment Administration.

By means of the radio talks broadcast from Washington on the Farm and Home Hour by a member of the staff, all this information was also given to the public. The script service to radio stations for local broadcast was continued, and over 200 radio stations are now receiving this service on request.

Several new film strips were added to the series circulated through the Extension Service, and a set of seven wall charts illustrating the principles of meat cookery were issued and placed on sale at the Government Printing Office.

REPORT OF THE DIRECTOR OF INFORMATION, 1934

UNITED STATES DEPARTMENT OF AGRICULTURE,
OFFICE OF INFORMATION,
Washington, D.C., August 31, 1934.

SIR: I present herewith a report on the information work of the Department for the fiscal year ended June 30, 1934.

M. S. EISENHOWER,
Director of Information.

Hon. HENRY A. WALLACE,
Secretary of Agriculture.

NEW POLICIES AND ACTIVITIES

The Department of Agriculture's traditional function of diffusing "useful information on subjects connected with agriculture in the most general and comprehensive sense" took on new meaning and vitality during the fiscal year 1933. I indicated this in my report last year. The same thing was true to a much greater extent during the fiscal year 1934.

Fundamental changes are being made on the farms—in production practices, farm management, and cooperative action. Farmers are taking economic forces into account and are altering their individual plans to meet new conditions. As a result, they have turned as never before to the Department of Agriculture for information. In the Office of Information several thousand letters are received each day. Those who write these letters want accurate information, and they want it promptly.

The Department has tried to meet both ordinary and emergency demands. The task has been handled efficiently in most cases. At other times emergency demands have come in so fast on so many phases of agriculture that it has been physically impossible to meet them as we normally would.

BACK TO GRASS AND FORAGE

During the year the Office of Information, in harmony with the emergency programs of the Agricultural Adjustment Administration to make supplies balance demand, intensified its activities on a back-to-grass-and-forage program, involving an increase in pasture and roughage acreage at the expense of cultivated crops. To help this Office in synthesizing the information on this subject available in many of the different bureaus, there was appointed a departmental committee consisting of J. T. Jardine, Chief of the Office of Experiment Stations, chairman; C. L. Holmes, Bureau of Agricultural Economics; R. R. Graves, Bureau of Dairy Industry; A. J. Pieters, Bureau of Plant Industry; C. B. Smith, Extension Service; and E. W. Sheets, Bureau of Animal Industry.

This committee formulated its program on the assumption that our foreign markets for agricultural products would not be regained immediately and that, until we can again sell the total output of our acres, there is no reason for farmers to produce to the limit of the land's capacity. With press releases, radio talks, and a special publication, the Department placed before farmers facts showing that wider use of pastures and meadows in our farming system will reduce the production of cash crops, slow up production of animal products per animal unit, conserve the fertility of the soil, and, for agriculture as a whole, will produce increased net returns.

On individual farms many questions affect the practicability of shifting substantially from cultivated crops to pasture and roughage. Each farmer must examine the problem for himself. Accordingly, the Department coordinated its informational material on this program with that of the State extension services. The States also intensified the work they have been doing along this line for years.

Probably the most effective single document issued in connection with this program was the Pasture Handbook, prepared by the Bureaus of Animal Industry, Plant Industry, and Dairy Industry. It is proving extremely useful to county agents and farmers as fundamental source material on the planting, care, and utilization of pastures.

Pastures, as we know them in the United States, are usually the most neglected part of the farmer's land. They must be made more productive to justify a major shift to grassland economy, and for this reason a great deal of basic information was issued on pasture improvement, the right legumes, proper mixtures, inoculation, fertilization, and careful use.

SOIL CONSERVATION

The drought, with its terrible consequences, naturally caused the Department temporarily to lessen its grass and forage campaign. At the same time the drought emphasized the wisdom of that program. Unprecedented dust storms in the East made urban dwellers conscious as never before that we have a pressing erosion problem in this country. It is sometimes difficult for the farmer to protect his land from soil erosion and loss of fertility. But if these forces can be checked without sacrificing net income, the effort is doubly worth while. Pastures preserve soil fertility. As a preventive of erosion, grass cover is second only to forest cover. Guided by the departmental committee, the information staff constantly emphasized these and related facts. The educational work must, of course, go on for several years. Radio, press, publications, and all other avenues of reaching the farmer must be used. The necessity of checking soil losses is so great that almost any amount of effort to give farmers and others the facts that will enable them to do it is justified.

ECONOMIC INFORMATION

Probably the most noticeable recent change in informational work is the farmer's greater understanding of economic data. A few years ago a report of total pork production in Germany or of milling restrictions in different European countries went almost unnoticed by the press and by farmers. Today such reports of the Bureau of Agricultural Economics are significant news, prominently played up by the press, read and understood by farmers. The Bureau of Agricultural Economics has done an unusual job of bringing to American farmers facts on the domestic and foreign supply-and-demand situations, on prices, grades, trade restrictions, and so on, which farmers need in formulating adjustment programs now available to them under the Agricultural Adjustment Act, and in planning changes in practices which they individually can make on their farms.

SUBSISTENCE FARMING

With opportunities at least temporarily closed to them in cities, hundreds of thousands of urban dwellers are looking for chances to make their living elsewhere. At the same time, the net migration was away from, rather than to, the farms last year. Thousands have turned to the Department of Agriculture for advice on the possibility of their going into subsistence or part-time farming. The usual bulletins of the Department on gardening, fruit growing, canning, poultry raising, and related subjects are not sufficient. Accordingly, in cooperation with the Subsistence Homestead Division of the Department of the Interior, the Department prepared and published a special bulletin on subsistence farming, giving information on selection of land and on possible lay-outs and production schedules; the bulletin also emphasized the limitations of small acreages as a means of self-support. If this general trend in the movement of population continues, the Department must do much more in the way of providing helpful information.

Here, as in many other phases of its activities, the Department has found its efforts made ineffectual because of inadequate printing funds. During the

year the Department was able to provide helpful publications to only about 35 percent of those who personally requested them.

FARM HOUSING

The results of a farm-housing survey, conducted by the Bureaus of Home Economics and Agricultural Engineering to measure the potential demand for improved home facilities, to determine the cost of providing such facilities, and to suggest plans for financing the work, were made available regularly during the year. One publication on farmhouse plans has been sent to the printer and a second on remodeling farm homes is being prepared. These will be useful in connection with the Government's efforts to stimulate home building. The Department's material, of course, stresses low-cost construction, and plans definitely suited to farm needs. The two bulletins will be the Department's first printed publications in the field of farm housing.

FOREST AND WILDLIFE CONSERVATION

The Federal Government is more active than ever in the field of forestation and wildlife conservation, and public attention to this work has reached a new peak. One of the most interesting publications printed during the year was the Report of the Presidents' Committee on Wild-Life Restoration. It has served admirably to promote a genuine public understanding of the present precarious status of our wildlife resources and of what must be done promptly to preserve them. In the field of forestry, the work of the Civilian Conservation Corps, the enlarged program of land purchase and forest improvement, provided material for press releases and radio programs in which the real fundamentals of forest conservation were set forth.

Frank E. Mullen, director of agriculture for the National Broadcasting Co., organized and broadcast throughout the year a weekly series of talks on conservation by national leaders in this field. Many Department officials participated in this series. The cumulative result of the year's educational work in conservation is an enhanced appreciation of the problem and intelligent support for long-time planning of our natural resources.

DROUGHT

Naturally the drought situation influenced everything done by the Department during the latter part of the fiscal year 1934. The Weather Bureau issued regular and special reports day by day. As the severity of the drought continued to grow, all branches of the Department were called upon to furnish facts and suggestions which would be helpful to farmers in adjusting themselves to drought conditions. The press releases and radio programs of the Department covered every phase of the subject, from telling farmers how to drill emergency wells and build trench silos, to suggestions on saving seed stocks, on growing forage and grasses, and on livestock feeding. The special drought surveys of the Bureau of Agricultural Economics commanded wide attention and were valuable not only to administrators in charge of emergency activities in drought relief work, but also to consumers who were given the facts about food supplies and were thus safeguarded from fears that might have been engendered by rumors.

CONSUMER EDUCATION

It has always been a function of the Department to provide consumers with unbiased information. Recently, however, consumers' interest in obtaining this unbiased information has increased materially. This was partly because of questions on grades and standards raised in numerous code hearings, partly because of special consumer broadcasts arranged by the Radio Service, and partly because of the Nation-wide discussions that developed around pending food and drug legislation.

The Department has attempted to inform consumers in the field of foods and drugs, so that they could buy intelligently. Particularly has it stressed that consumers should read labels before they buy. The Food and Drugs Act has jurisdiction over labels, and it has been more than worth while to use radio, the press, and mimeographed leaflets in teaching consumers this fact and in explaining what label statements mean.

One publication, *Present Guides to Household Buying*, has been in great demand, especially by consumers' organizations that have been developing in many of the cities and small towns.

The Bureau of Home Economics was of great help to relief agencies and, through press releases, broadcasts, and special publications, to consumers generally in showing how adequate diets could be provided at minimum cost. Also, when meat was distributed by the Federal Emergency Relief Administration, the Bureau issued special leaflets showing how this meat could best be cooked.

HELP TO A.A.A.

The informational forces of the Department continued to give every assistance to the Agricultural Adjustment Administration. The Radio Service was particularly active in this respect; I wish to call attention particularly to the radio section of this annual report. What we tried to do consistently was to provide the public with factual information from all branches of the Department which was helpful in carrying forward the programs of the Agricultural Adjustment Administration.

DISSEMINATION OF RESEARCH RESULTS

Lately there has been considerable publicity in the press regarding an apparent conflict in the Department's continuation of research work while the Agricultural Adjustment Administration seeks simultaneously to reduce or control the farm output. Department officials, but not always the public, understand that the purpose of research is to promote efficiency, to lower production costs, widen markets, develop new uses for farm products and byproducts, improve quality, and raise farm living standards. Efficiency in this sense does not necessarily mean larger total production. There is no inconsistency in regulating the total output of the farm plant and at the same time producing that total output at the lowest possible cost.

The public would not find an inconsistency here if it were more intimately familiar with research itself. The Department is constantly conveying the results of its research work to the public, but I recognize that usually only those who have a need for such information study it deeply and really understand it.

One of the greatest deterrents to proper understanding is the Department's inability to publish the results of its own work. Research has not finished its job and the expenditure of funds for research has not been fully justified until the usable results are made available. At present many research manuscripts are being placed in the files, unpublished, and thus the new knowledge contained therein rests in closed compartments awaiting a future day. Eventually this material must be published. In the meantime, scientists are becoming discouraged. They are reluctant even to prepare manuscripts, knowing that the chances of publication are limited. For example, in one field—life studies of insects—the Department has for several years been able to print only a small portion of the manuscripts actually prepared. The Chief of the Bureau of Entomology and Plant Quarantine has pointed out that this is not only discouraging to entomologists who make these studies, but it also hampers control work which is, of course, based upon a proper understanding of the life histories, habits, and other special characteristics of the different insects.

For a number of years I have felt that we should have, in our work of publishing scientific material, a departmental committee to determine finally all disputed points in technical material, and to aid this office in judging the relative value of different research manuscripts. J. R. Mohler, Chief of the Bureau of Animal Industry, J. T. Jardine, Chief of the Office of Experiment Stations, and F. D. Richey, Associate Chief of the Bureau of Plant Industry, have accepted an invitation to serve on such a committee.

EXPENDITURES

A complete report of a year's informational activities would require a study and discussion of all departmental research, regulatory, conservation, service, road-building, and extension activities and the dissemination of information made available by those activities. This is clearly impossible. I have merely used a few examples of the past year's work to indicate the diversity and general character of the informational efforts. The usual function of spread-

ing useful, unbiased information remains. The opportunities for doing socially and economically worth-while work are much greater. Farmers show every intention of reshaping their individual and collective practices so as to retain their proper place in the economic structure of the Nation. To help them do that this Department must place every shred of useful information at their disposal.

Printing charges in the fiscal year 1934 amounted to \$685,466; the remainder of the appropriation of \$850,000 was impounded. Payments for salaries and general expenses totaled \$312,840, the larger items in this amount being \$74,711 for the operation of the Department's duplicating plant, \$39,248 for the distribution of publications, \$28,600 for all photographic work, \$26,493 for the press service, and \$25,931 for the radio service; payments for general administration, manuscript editing, indexing, drafting, etc., accounted for the remainder.

DIVISION OF PUBLICATIONS

The usefulness of the Department's publications in furthering the recovery programs of the Government, was constantly demonstrated during the year. Groups, and particularly project workers in the States, engaged on various phases of relief, conservation, adjustment, and development work kept in touch with the publication activities of the Department and sought the material suited to their needs. Several of the new publications issued during the year to which attention should be called are Economic Trends Affecting Agriculture, Agricultural Adjustment Measured in Progress Toward Parity Prices, The Agricultural Outlook for 1934, Diets at Four Levels of Nutritive Content and Cost, Food Budgets for Nutrition and Production Programs, Rural Factory Industries, Report of the President's Committee on Wild-Life Restoration, Improving the Farm Environment for Wild Life, Our Forests—What They Are and What They Mean to Us, Canned Beef Recipes, How to Cook Salt Pork, A Pasture Handbook, Planning a Subsistence Homestead, and Present Guides for Household Buying.

Many of the publications issued in previous years, especially those on soil erosion, reforestation, food production and preservation, textile utilization, adaptation of crops and varieties to particular regions, farm management, home production of fruits and vegetables, and statistical data on agriculture, proved to be very helpful. Several of the regular periodicals bear significantly on the work of the recovery agencies. Thus the monthly periodicals, The Agricultural Situation and Crops and Markets, furnish basic information for administrators of the Agricultural Adjustment Administration, county production-control associations, and farmers generally. The Extension Service Review carries to county agents and vocational teachers timely information on all departmental and adjustment programs.

ECONOMY MEASURES CONTINUED

The work of the Division of Publications was carried on with reduced personnel; there were 19 fewer employees on the rolls than there were the previous year. Although this reduction was offset in part by temporary employees detailed to the Division by the Agricultural Adjustment Administration, a great deal of overtime work was required. This was due to the necessity of getting through a tremendous volume of rush administrative forms, doing an increased amount of photographic and illustrative work, duplicating such a large volume of material that a special night force was engaged by the Agricultural Adjustment Administration, and integrating special emergency mailing lists into those already in use by the Department.

In general, the economy measures outlined in this report for 1933 were followed throughout the year. Some adjustments were accomplished here and there. For example, toward the close of the fiscal year the ban on color plates in the Journal of Agricultural Research was raised and color work was authorized for the fiscal year beginning July 1, 1934, provided the originating bureau was willing to have charged against its allotment the printing costs of the Journal separates containing color plates. The same opportunity was extended to articles from the experiment stations, provided the emanating station had the plates prepared and printed and furnished enough copies for the journal and separate. Restrictions on the number of bulletins available to the State extension services were modified somewhat.

FEWER MANUSCRIPTS PRINTED

On account of the continued reduction in printing funds and a large increase in the cost of printing, 33 percent fewer manuscripts were received from the bureaus and 37 percent fewer were sent to the Government Printing Office than during the preceding year, 1,058 manuscripts having been received during the year and 1,026 sent to the Government Printing Office as compared with 1,592 and 1,629, respectively, for the preceding fiscal year. More detailed attention in editing was given to these manuscripts than ever before. The practice of conferring informally with bureau editors and authors regarding specific manuscripts resulted in completed work of a superior nature.

On April 1, 1934, the Government Printing Office increased its charges by 21.7 percent: 10 percent on account of salary adjustments, and 11.7 percent on account of higher paper and other costs. This unexpected increase, which was applied to all pending requisitions regardless of the date on which they were submitted to the Printing Office, upset our carefully laid plans to obligate a given portion of the available funds each month. Instead of having approximately \$75,000 available for printing during May and June, the increased charges on the pending requisitions completely eliminated the favorable balance. At the same time the bureaus had a great deal of urgent material for printing during the last 2 months of the fiscal year. The Bureau of the Budget, therefore, approved the Department's request for an additional \$75,000 for printing, making a total of \$685,466 for the year. The increase by the Bureau of the Budget was possible only because the appropriation for the year was \$850,000, the balance having been administratively impounded. The situation during the fiscal year 1935 will be a different matter. With the appropriation itself only \$610,466, and with costs up fully 20 percent, the Department will have to put more and more of its research and other manuscripts aside unprinted. I cannot too strongly point out that a great educational institution requiring many millions of dollars for its operation should not be made inefficient and often entirely ineffective by the inadequacy of funds for the final stages of its work—namely, publication.

In addition to the detailed work of handling the manuscript and job work involved in the expenditure of the \$685,466 for printing and binding, for which 3,503 requisitions were written, an additional 1,367 requisitions were sent to the Government Printing Office for the printing of 214,306,869 pieces of printed matter for the Agricultural Adjustment Administration. Practically all of this latter work was of emergency nature. The Government Printing Office cooperated whole-heartedly in expediting the material through the plant and in mailing it promptly.

ILLUSTRATING, INDEXING, AND MAILING

The demand for illustrative material was especially heavy. The use of the rotaprint and multilith machines in the Division, largely for the printing of illustrative material, has brought a heavier demand for the preparation of that type of material, particularly for the various projects of the Agricultural Adjustment Administration, including the issuance of the multigraphed publication, Consumers' Guide. The request for photostat work increased to such an extent that it was necessary to buy an additional machine. Other phases of the illustrations work increased more than threefold over that of the previous year. In addition to the work done for the Department, the Section of Illustrations of the Division also did some work during the year for nine other Government agencies. The total number of photographic jobs done amounted to 206,422 and the drafting jobs to 2,407. Proceeds from miscellaneous sales of photographic work to the public amounted to \$174.91.

The Index to Publications of the United States Department of Agriculture, 1926-30, was sent to the printer during the year. The work of indexing the entire Department Bulletin series was completed, and the manuscript should be sent to the printer during the fiscal year 1935.

In the Mailing Lists Section 61 lists were established for the Agricultural Adjustment Administration, totaling 26,595 names. These lists were consolidated in the master card index maintained in the section. Fifty-one lists totaling 10,020 names were also established for the emergency agricultural agents in the cotton, corn-hog, wheat, cigar-tobacco, flue-cured-tobacco, burley-tobacco, beet- and cane-sugar, rice, dairy, and drought-stricken areas. Ten new lists were established for other bureaus and 4 were eliminated.

16-PERCENT DECREASE IN DISTRIBUTION

During the year 12,497,706 Department publications were distributed, exclusive of the 3,079,100 Farmers' Bulletin Lists and 184,000 copies of the Monthly List of Publications. This total was about 16 percent less than the 14,818,459 copies distributed during the preceding fiscal year, exclusive of the lists mentioned. As shown in table 1, the largest number of copies distributed of any series was 6,201,203 farmers' bulletins. This number was 1,166,845 less than the number distributed last year. Members of Congress distributed 4,343,021 copies of farmers' bulletins and leaflets to their constituents—1,291,824 copies less than in 1933. The general curtailment of distribution was due entirely to the economy program. Members of Congress, recognizing the stringent situation, generously cooperated by returning 1,644,853 copies of farmers' bulletins to the credit of the Department for use in answering correspondence. The Superintendent of Documents sold 387,525 copies of Department of Agriculture publications exclusive of periodicals. The total sales for all series amounted to \$44,878.92 of which \$14,205.69 was for periodicals.

During the year 88,298,169 pages of multigraph, mimeograph, rotaprint, and multilith material were issued as compared with 38,722,329 pages the preceding year. The heavy increase of 128 percent was accounted for by the emergency work of the Agricultural Adjustment Administration.

TABLE 1.—Summary report of publications received and distributed by the Office of Information, Department of Agriculture, from July 1, 1933, to June 30, 1934

Item	Copies on hand July 1, 1933	Copies of new publications received	Copies of reprints or revisions received	Total copies available for distribution during year	Copies distributed during year	Copies on hand June 30, 1934
Agricultural Situation.....		186,000		186,000	186,000	
Annual reports.....	10,821	45,825		56,646	38,579	18,067
Circulars.....	415,421	178,000	84,400	677,821	233,626	444,195
Climatological data.....		6,090		6,090	6,090	
Climatological data (section summary).....		129,000		129,000	129,000	
Clip Sheet.....		321,300		321,300	321,300	
Crops and Markets.....		1,718,100		1,718,100	1,718,100	
Department bulletins.....	198,576		30,000	228,576	35,834	192,742
Department circulars.....	104,814		8,500	113,314	15,616	97,698
Experiment station bulletins and reports.....	4,629	18,900		23,529	19,874	3,655
Experiment Station Record.....		76,250		76,250	76,250	
Extension Service Review.....		104,000		104,000	104,000	
Farmers' bulletins.....	7,677,956	849,841	5,667,321	14,195,118	6,201,203	7,993,915
Farmers' bulletins, lists.....	881,300		3,080,000	3,961,300	3,079,100	882,200
Forest Service recreational folders.....	91,460	158,000		249,460	160,930	88,530
Forest Worker.....		1,000		1,000	1,000	
Indexes.....	12,786	31,380	300	44,466	32,694	11,772
Inventories of seeds and plants imported.....		4,500		4,500	4,500	
Journal of Agricultural Research.....	19,532	38,495		58,027	58,027	
Journal of Agricultural Research separates.....	240,630	66,940		307,570	307,570	
Leaflets.....	1,102,943	155,000	501,000	1,758,943	756,368	1,002,575
Miscellaneous circulars.....	186,799		29,500	216,299	32,599	183,700
Miscellaneous publications.....	384,294	365,200	518,500	1,267,994	599,987	708,007
Monthly List of Publications.....		184,000		184,000	184,000	
Monthly Weather Review.....		18,000		18,000	18,000	
Monthly Weather Review separates.....		12,700		12,700	12,700	
North American Fauna.....	1,524			1,524	367	1,157
Official Record.....		14,900		14,900	14,900	
Posters.....	198,972	33,500	10,000	242,472	47,528	194,944
Public Roads.....		49,000		49,000	49,000	
Service and regulatory announcements.....	108,340	390,650	90,200	589,190	483,692	105,498
Soil surveys.....	3,988	44,800	6,000	54,788	27,988	26,800
Statistical bulletins.....	35,296	20,800	2,000	58,096	19,666	38,430
Technical bulletins.....	280,838	146,150	27,000	453,988	163,864	290,124
Unnumbered publications.....	391,885	239,700	126,500	758,085	347,219	410,866
Weekly weather crop report and snow and ice bulletins.....		244,800		244,800	244,800	
Yearbooks.....	10,925	15,000		25,925	12,231	13,694
Yearbook separates.....	121,768	133,850	17,000	272,618	56,604	216,014
Total.....	12,485,497	6,001,671	10,198,221	28,685,389	15,760,806	12,924,583

PRESS SERVICE

Naturally, the press of the country devoted first attention last year to the activities of the Agricultural Adjustment Administration; but partly because of the great interest in agricultural affairs, even more attention than usual was given to the information made available by the work of many bureaus of the Department. This was particularly true of all economic information and of material closely related to changes in cropping and livestock plans, drought problems, animal-disease eradication, erosion prevention, seed supply, and the increase in grass and forage crops. At the same time the scientific, economic, regulatory, and service activities of the regular Department demanded practically as much attention as before. Unfortunately, in many instances, it was impossible to give time to matters on which press information might usefully have been issued.

On the whole, the press activities of the Department present a very different picture from that of a few years ago. Formerly, only a few press-association correspondents were assigned to cover the Department. Now, a score of correspondents make effective use of the press room and at least 40 attend the regular weekly press conferences. The representatives of the press know exactly what facts they want, and it is the job of the Press Service to supply them. Telephone and other calls for information are received every minute of the day. With a force considerably reduced by the Economy Act, the Press Service must do the best it can. The addition of one writer toward the end of the fiscal year did not relieve the pressure of office work, but enabled the Press Service to cover the Department more adequately and to prepare considerably more material demanded as the result of such emergencies as the drought and the various developments in Department activities resulting from it. The writer newly appointed was K. C. Charles, formerly with the Des Moines Register-Tribune.

IMPROVED PRESS COOPERATION

Several factors have tended to smooth the way for press information. Along with the growing interest of the public in news of science and economics, a fact which is certainly beyond argument, there is a growing appreciation by the Department personnel of the need to make the results of their work understandable to laymen. The Press Service now has the whole-hearted cooperation of Department administrators and scientists in the preparation of news and interpretive articles. One reason for a different attitude from that of 2 or 3 years ago is that, following a period in which scientific work was subjected to unfounded criticism, there is now a noticeably better understanding of these activities. It may be that unreasonable criticism, by bringing out a strong defense from organizations, influential individuals, and the press, has done scientific work a good turn. Reorganization in some of the bureaus also has resulted in better arrangements for cooperation with the Press Service. In the Bureaus of Biological Survey and Entomology and Plant Quarantine, for example, informational responsibilities have been concentrated in special divisions with good results.

I should like to repeat a policy statement which I made in 1931, to the effect that agricultural information work is not carried out to secure publicity for the Department, but to give the widest possible distribution to valuable facts. The knowledge developed by the Department must be widely and quickly disseminated if it is to make its full contribution to the social and economic progress of the country. This general principle governing our press work is now understood by all in the Department and by the press generally. As a result, the press has great confidence in the Department's releases and relies upon the Press Service constantly for help. This confidence in turn enables the Press Service to do much constructive work in placing valuable information in all classes of newspapers and periodicals so as to reach directly the specific groups most interested in the information.

The cumulative effect of Press Service activity toward a better understanding of scientific matters was illustrated by the widespread reports on the dust storms of last spring which rose in the drought areas of the Mississippi Valley and spread a choking haze across country to the Atlantic seaboard. These storms were rightly regarded both by press writers and the reading public as of great significance. The press interpreted the storms correctly as an evidence of destructive erosion. For at least 7 years the Press Service has worked with the soil scientists in reporting various phases of erosion and

the alarming facts developed by scientific study of the problem. At first the press paid relatively little attention to the subject, but this year it was evident that correspondents were aware of the situation and were well informed as to the meaning of the dust storms and the significance of erosion.

DISTRIBUTION OF RELEASES

Distribution schemes were made out for 3,038 releases during the year, an increase of 1,565 over the number the year before. This includes 1,465 releases issued by the Agricultural Adjustment Administration. The remaining 1,573 releases on the work of the regular bureaus of the Department represent an increase of 100 above the number the previous year. The releases, including addresses, average about two and a half pages in length. One noticeable development this year was the continual demand for reruns of releases, particularly for large numbers of copies of addresses by the Secretary and other officials. All releases are, of course, coded to specific mailing lists so that material on wheat, for example, goes only to papers interested in that commodity.

This year but little attention was given to syndicate series. However, the Market Basket series continued to be as popular as ever and is now in its fourth year. The Western Newspaper Union uses much of Department material, including many special illustrated articles on home-economics subjects, and particularly releases on livestock, gardening, and crop production. A group of 25 special articles illustrating practical applications of the Department's work to problems of everyday life was prepared for the Civics Research Council and distributed by them to newspapers throughout the country.

Pictures for spot news stories were in more demand than ever this year. Photographs to illustrate important research results were taken and distributed through the usual channels. Feature writers interested in various phases of the Department's work were aided in obtaining suitable illustrations.

RADIO SERVICE

In the annual report for the fiscal year 1933 I noted the first steps in broadcasting information about the national plans for agricultural adjustment. I also discussed in some detail the network broadcasts and syndicate radio releases which were issued by the Department and cooperating State extension services for the information of farmers eligible to participate in the 1933 cotton-adjustment program.

Activities during the first half of the fiscal year now under review followed the pattern outlined in the 1933 report; i.e., while continuing to report to listeners the important current developments of the regular work of the Department we concentrated our attention for the duration of the cotton-contract sign-up period on placing needed information before growers so that they might make intelligent decisions as to their part in cotton-acreage adjustment. Within the 3 weeks of the intensive cotton-adjustment sign-up campaign, the Radio Service broadcast 15 programs in the National Farm and Home Hour, 4 in the Western Farm and Home Hour, 9 in evening periods on National Broadcasting Co. networks covering the Cotton Belt, and 9 in evening periods on similar Columbia Broadcasting System networks. Simultaneously, in cooperation with extension editors in the cotton-producing States, the Radio Service provided independent stations covering the Cotton Belt with daily farm-flash releases dealing with the more local aspects of the emergency-adjustment program. A total of 18 local releases was thus broadcast by 102 stations in the major cotton-producing States.

After the sign-up phase of the cotton-adjustment program was concluded, the Farm and Home Hour programs and the syndicate programs continued to carry adjustment information to cotton producers. But major attention shifted to the program for wheat adjustment which was being worked out by farm leaders in cooperation with the Agricultural Adjustment Administration. When officers of the A.A.A. wheat section, the Extension Service, and the Crop Reporting Board went out to regional centers in the wheat territory—Kansas City, Spokane, Fargo, and Columbus—to consult with farmers, the Radio Service arranged for evening broadcasts on radio stations in each city so that listeners might be promptly apprised of the results of the meetings. Upon the return of the Department officers to Washington, further reports were made in the National Farm and Home Hour and transmitted by radio to San Fran-

cisco for broadcast in the Western Farm and Home Hour. As soon as the decision was reached to undertake an acreage-adjustment program for wheat, and the contract was ready to place before individual farmers for signature, 3 broadcasts each week in the National and Western Farm and Home Hours and 1 evening program each week on the 2 major networks were scheduled. Three weekly farm-flash releases on the wheat-adjustment program were forwarded to State extension editors. In all, during the sign-up period for the wheat program, there were 22 broadcasts each in the National and Western Farm and Home Hour network programs, 7 evening programs on National Broadcasting Co. networks, 6 on Columbia Broadcasting System networks, and 24 farm-flash releases.

While the wheat program was going forward, the sign-up was in progress for adjustment of acreage of two types of tobacco—cigar and flue-cured. To provide tobacco growers with information on the economic position of their industry and the plans for correcting it, there were 5 broadcasts in the National Farm and Home Hour, 3 in evening periods on National Broadcasting Co. networks, 3 in evening periods on Columbia Broadcasting System networks, and 12 farm-flash releases.

At the same time, numerous broadcasts were devoted to the progress made in the adjustment programs for the sugar industry, the dairy industry, the corn-and-hog industry, and the specialty industries producing various types of fruits and vegetables. The Radio Service also included in network programs and syndicate releases the important economic reports of the Department and reports on significant findings of the Federal research scientists.

1934 ADJUSTMENT CAMPAIGNS

At the turn of the calendar year efforts were directed to broadcasting information for farmers eligible to cooperate in the 1934 programs for adjustment of cotton acreage, corn acreage, and hog numbers. During January, the Radio Service issued, to explain the cotton-adjustment program, 8 talks or interviews in the National Farm and Home Hour, and 3 in the Western Farm and Home Hour, 4 programs in evening hours on National Broadcasting Co. networks, 4 in evening hours on Columbia Broadcasting System networks, and 12 syndicate releases.

Toward the end of January the program of adjustment in corn acreage and hog numbers was nearly ready to take to producers. Accordingly, schedules were set up for sending farmers information on this program. During the next 6 weeks there were 10 broadcasts each in the National and Western Farm and Home Hours, 4 in evening periods on National Broadcasting Co. networks, and 2 on Columbia Broadcasting System networks.

Also, in the preliminary period when Agricultural Adjustment Administration and Department officers were meeting the farm leaders in regional centers of corn and hog production, broadcasts were arranged on radio stations located in each of the cities visited, so that farmers of the region might learn the progress made toward agreement on details of the program.

While the corn-and-hog contract signing was yet in progress, a proposal for adjustment of milk production was laid before the dairy industry of the Nation. This proposal was taken directly to farmers in 15 regional meetings. Again, the Radio Service made arrangements for broadcasts by radio stations in each city reporting on the details of the proposal for dairy adjustment. Morse Salisbury, chief of radio service, at the request of Agricultural Adjustment Administration officers, became a member of the Administration group which conducted the informational meetings in key cities of the Northeastern States.

Toward the end of the fiscal year, the attention of the radio audience was directed toward the cropping systems which should prevail not only on farms whose owners had entered into adjustment contracts but on other farms as well. For the immediate future, and for the long pull, the Department recommended an increase in the acreage of pasture and forage crops. A series of network and syndicate broadcasts outlined the reasons for these recommendations, and gave results of research that would influence the practices of the farmers adopting the recommendations.

BROADCASTS FOR CONSUMERS

Throughout the year, the Radio Service assisted the Consumers' Counsel of the Agricultural Adjustment Administration in preparing and broadcasting

a weekly program over National Broadcasting Co. networks. The aim of this program was to keep the consumers of the Nation in touch with the steps taken in the program for agricultural adjustment, and to help them set up safeguards against the pyramiding of processing taxes. The Radio Service also arranged a series of 6 weekly programs on National Broadcasting Co. networks in which W. R. M. Wharton, chief of the Eastern District of the Food and Drug Administration, gave additional information on labeling of foods and drugs, continuing the work that he began in 1930 and 1931 with the popular series of morning network broadcasts entitled "Safeguarding your food and drug supplies." In the National Farm and Home Hour a series of 8 weekly broadcasts by Walter G. Campbell, chief of the Food and Drug Administration, explained the provisions and limitations of existing Federal food and drug legislation. Broadcasts on home economics were also regular features in the network and syndicate series.

PERSONNEL

The intensified schedule of broadcasts was carried on throughout most of the year without addition of personnel. As a matter of fact, personnel available for work on this heavy schedule was cut down for a period of 4 months when Ralph Lamb, in charge of Western Farm and Home Hour programs, resigned; and Alan Dailey, extension radio specialist, was assigned to San Francisco pending completion of a civil-service examination to fill this position.

The man appointed, Wallace Kadderly, formerly manager of KOAC, Oregon State Broadcasting Station, took over the job on December 1, 1933. He has introduced a number of beneficial changes in the Western Farm and Home Hour. One important change is an arrangement whereby speakers for this program can be put on the air from any one of four points in the Pacific States, instead of only from San Francisco, as was previously the case. This makes it possible to include in Western Farm and Home Hour programs reports by agricultural authorities who cannot go to San Francisco to broadcast. Mr. Kadderly also has introduced a condensed daily report of markets for western products. The early response has been highly commendatory.

Toward the end of the year the Radio Service obtained much-needed assistance in handling the increased volume of programs for homemakers through the assignment of Josephine Hemphill, formerly home-economics radio writer in the Service.

FIELD WORK IN RADIO

In the last 2 months of the fiscal year, although the demands for writing and production service were still extraordinarily heavy, the radio-extension specialist was assigned to make a reconnaissance visit to agricultural-extension editors and radio stations in typical States of the South and Midwest. This important job should have been undertaken earlier, but it was impossible because of the overload of writing and production work in the Washington office. The radio-extension specialist had not been in the field for a thorough study of the results obtained by correlating Federal and State broadcasting through syndicate services, since the establishment of this program in January 1932. Neither the State extension editors nor the Department Radio Service had had an opportunity to pause and examine the trends in this work.

The report of the extension specialist, which has been separately filed and is available in the Office of Information, indicates in a striking way the progress made so far, and the barriers to further progress which must be removed in the coming years. This report indicates that radio stations are even more willing than formerly to provide schedules which will enable the State extension services and the Department to broadcast information at a time when farmers are likely to be listening. It also shows that farm people have come to depend upon the network and the localized broadcasts for authoritative day-to-day information on national economic programs for agriculture, and on the results of the scientific investigations that indicate need for changes in farm practices.

However, the extension specialist's report warns that there are several barriers to the most effective use of the time made available by individual radio stations. One is that the extension editors have not the personnel available to make the releases provide the greatest amount of locally applicable information. Another is that the releases will not be completely effective until they are broadcast by persons recognized locally as agricultural and govern-

mental authorities; in other words, by the county agricultural-extension agents located in the places where the cooperating broadcasting stations are located.

SURVEYS SHOW VALUE OF PROGRAMS

Our program for the coming year must include cooperation with the State extension services to eliminate these barriers to effective local broadcasting of agricultural information. At the same time, we must maintain with vigor a program of daily network broadcasting in the National and Western Farm and Home Hours. That these programs are increasingly effective was indicated during the past year by a survey conducted by a trade magazine.

From the responses of farmers, the editors concluded that the Farm and Home Hour was the most popular daytime program with farm people. The Hour was exceeded in popularity among rural listeners only by three evening programs. A recent survey by a commercial service showed that of all daytime sustaining programs the Farm and Home Hour is the most popular with city listeners. Additional evidence of the educational value of farm programs was obtained when a Michigan station asked its listeners whether it should continue to broadcast the Farm and Home Hour; 98 percent of more than 3,000 listeners responding asked for continuance and said the program was of real value to them.

REPORT OF THE LIBRARIAN, 1934

UNITED STATES DEPARTMENT OF AGRICULTURE,

LIBRARY,

Washington, D. C., August 31, 1934.

SIR: I have the honor to submit herewith the report of the Library for the fiscal year ended June 30, 1934.

Respectfully,

C. R. BARNETT,
Librarian.

HON. HENRY A. WALLACE,
Secretary of Agriculture.

The following summary of the work of the past year is based on the manuscript reports submitted by the heads of the divisions of the Library and the reports of the branch libraries in the various bureaus. To reduce printing costs, only three of the statistical tables are included this year, namely, (1) the combined statistics of circulation, (2) the statistics of bureau libraries, and (3) the financial statement. Some of the more important statistics are included in the body of the report.

ACCESSIONS

The number of books, pamphlets and maps purchased last year as compared with those purchased in the fiscal year 1933 was as follows: Books, 1,218 against 2,121 in 1933; pamphlets, 109 against 130 in 1933; maps, 1 against 39 in 1933; serials and continuations, 656 against 916 in 1933. The total number of purchases was 1,984 in contrast to 3,206 in 1933. This decrease was due mostly to the decrease in the Library appropriation, the amount available for the purchase of books being \$2,500 less than in the fiscal year 1933, and \$8,600 less than in 1932, but in comparing 1934 with the previous years, the changes in rate in foreign exchange in 1934 must also be taken into consideration. For the first time in the history of the Library the funds for the purchase of books and periodicals were exhausted as early as February. Because of the Library's limited funds no additions of note were made during the year to its collection of old and rare books. The number of books, pamphlets, and continuations received last year by gift and exchange was also less than in the previous year, being 8,428; the year before there were 10,286. Grateful acknowledgment is made to the many institutions, societies, officials, and publishers in this country and abroad who have carried the address of the Department on their mailing lists, and to private individuals who have generously contributed publications to the Library. The number of accessions through the binding of periodicals and other serials was 3,506 as opposed to 3,878 in the fiscal year 1933. The total number of accessions for the year was 14,688 whereas there were 17,696 in the fiscal year 1933.

On July 1, 1934, the Library contained 251,843 accessioned volumes and pamphlets. In addition, however, to these accessioned volumes and pamphlets, the Library contains several thousand volumes of Government documents, many thousands of pamphlets, and many hundreds of periodicals, bulletins, and reports in temporary binders which have not been accessioned. The actual number of volumes and pamphlets in the Library is therefore uncertain. It is hoped that sometime a complete and accurate count of the Library's collections can be made.

CATALOGING AND CLASSIFICATION

The Catalog Division (Helen M. Thompson, Chief) reports that the total number of books, pamphlets, serials, and maps classified and cataloged in the main library during the past year was 14,821, a decrease of 3,046 from the

number in the previous year. In addition to the material which was fully cataloged, author cards were made for 121 pamphlets and 4,622 reprints. The number of reprints cataloged was more than 10 times the number cataloged the previous year. This was due to the additional help in the cataloging work made possible through Civil Works Administration funds. The latter funds also made possible the cataloging of some of the State experiment station publications. The cataloging work done under this grant is more fully described below, along with the other work which this grant made possible.

The number of cards prepared for printing by the Library of Congress in the Agr. series was 894 in contrast with 1,175 in the previous year. The number of printed cards received from the Library of Congress was 986 as compared with 1,176 in the previous year. The cards added to the main catalog numbered 32,908, while 9,346 were withdrawn, making a net increase of 23,562, the net increase the previous year having been 21,289. The number of cards added to the various catalogs and indexes maintained by the branch libraries in the bureaus and divisions is shown below:

Agricultural Economics -----	15,782	Dairy Industry-----	1,308
Division of Cotton Market- ing-----	2,500	Entomology-----	6,129
Agricultural Engineering-----	1,785	Division of Bee Culture--	1,500
Animal Industry-----	5,425	Experiment Stations-----	6,840
Animal Husbandry Divi- sion-----	812	Forest Service-----	20,000
Bureau of Chemistry and Soils--	2,250	Home Economics-----	669
		Plant Industry-----	23,743
		Public Roads-----	15,943

During the past year the growth of the main dictionary catalog made it necessary to add three 60-drawer cabinets and to shift the entire catalog. This now fills 1,304 drawers. The total number of cards contained in the main catalog of the Library is 773,853, and the number of cards in the special catalogs and indexes of the branch libraries in the various bureaus is 2,025,870, making a total of 2,799,723.

The new edition of the Library classification which was prepared last year and sent to the Public Printer on June 18, 1933, was received from the Printer on January 22, 1934. It was the fourth edition of the classification and contains 58 printed pages, exclusive of the index and preface, as compared with 35 pages in the third edition, issued in 1916, 22 pages in the second edition issued in 1906, and 10 pages in the first edition issued about 1898. The total number of classes in the last edition is approximately 2,100 while the number in the first edition was only 230. In the last edition, horticulture and agricultural economics were much expanded.

PERIODICALS

The Periodical Division (Lydia K. Wilkins, Chief) reports that the total number of different periodicals received by purchase, gift, and exchange was 4,398 as compared with 4,319 in 1933. The number received by purchase was 1,386, and 3,012 were received by gift. The net increase for the year was 79. In order to meet the demand for certain periodicals it was necessary to purchase 314 duplicate copies, making the total number of periodicals purchased 1,700, an increase of 92 over the number purchased the previous year. The Library also received 323 duplicates by gift and exchange for regular circulation. The total number of current periodicals received during the year was therefore 5,035, an increase of 166 for the year. It is estimated that the number of separate numbers of current periodicals received during the year was 78,000, or an average of 256 a day.

No separate record is kept in the Periodical Division of the number of continuations received, but the records of the Catalog Division show that 5,714 continuations were cataloged during the past year, a decrease of 1,438 from the number the previous year.

The number of dailies received was 141, including 32 extra copies. The dailies are not included in the 4,398 current periodicals noted above, neither are the periodical publications of this Department nor the farm bureau publications included. The current issues of the farm bureau publications are received direct by the Office of Experiment Stations library and filed there for a year. The number currently received was 177. During the past year the back file of farm bureau publications was rearranged, and the second set of State experiment station publications for the reference room was also put in order.

Although the funds available for the purchase of books and periodicals during the year has been \$2,500 less than in 1933, and although the cost of foreign periodicals has almost doubled because of the advance in foreign exchange rates, nevertheless a special effort was made to continue all foreign periodical subscriptions.

BINDING

The Binding Section is one of the units of the Periodical Division and is now in charge of Joseph J. Canavin, under the general supervision of Elizabeth G. Hopper, Assistant Chief of the Periodical Division. They report that the number of books and periodicals sent to the Government Printing Office for permanent binding was 7,895, an increase of 2,180 over the number sent during the previous year. The number of books and periodicals placed in temporary binders was 2,329, a decrease of 396. The number of current serials added to binders was 954, a decrease of 134. The number of pamphlets stapled in binders was only 44, a decrease of 510. As the need of the Library for increased funds for binding has been emphasized in many previous reports, it is particularly gratifying this year to be able to report a substantial increase in the number of permanently bound books. It was made possible because of the increased allotment for binding granted by the Office of Information. To take full advantage of this increase it was necessary to detail an assistant from the Catalog Division for several months to help in the preparation of the volumes for binding. For approximately 4 months the Binding Section also had the services of three assistants employed under Civil Works Administration funds. The additional help provided under these funds also made possible a beginning in the oiling of the leather-bound books, a large number of which are greatly in need of attention, as the leather has become dry and powdery. The formula used was given to the Library by R. W. Frey, of the Leather and Paper Laboratory, Bureau of Chemistry and Soils, and he also gave the necessary instructions for the initiation of the project. The bound sets of Department publications and State experiment station publications, various sets of chemical journals, and some miscellaneous volumes were treated. This is only a small part of those which need treatment, but now that a beginning has been made it is hoped that a permanent assistant for this work can soon be provided.

USE OF THE LIBRARY

The Readers Division (Emma B. Hawks, Associate Librarian, in charge) reports that the reference use of the Library has greatly increased during the past year, due in part to the new activities of the Agricultural Adjustment Administration, and also to the fact that more offices of the Department are now in close proximity to the Library. While the past year has unquestionably been the busiest in the history of the Library, the total circulation is only slightly over that of the previous year. The combined statistics of circulation in the main Library and in the branch libraries, which are given in table 1, show a recorded circulation of 70,930 books and 263,200 current periodicals, a total of 334,130. These figures, however, indicate only approximately the use of the Library, as no record of the circulation of periodicals is kept in the Library nor in the Bureau of Agricultural Economics library. Also, no record is kept of the reference use, either in the Library or in any of the bureaus.

Interlibrary loans from this Library to libraries outside of Washington totaled 2,315. These loans were divided as follows: to land-grant colleges and experiment stations, 1,106; to Department workers stationed outside of Washington, 599; to colleges and universities other than land-grant colleges, 253; to other scientific institutions, 165; to business firms, 105; to public libraries and miscellaneous, 87. With two exceptions, loans were made to every State in the Union, the largest number being sent to New Jersey. Loans were also made to institutions in Canada, Mexico, Puerto Rico, and Hawaii. In addition to the 2,315 books and periodicals lent to libraries outside the city, 52 photostat copies and 15 typed copies of articles were supplied, making a grand total of 2,382 loans for the year, a decrease of 37 from the number of the previous year.

Loans to the Library from other libraries in Washington were granted to the number of 4,914. Of these, 4,025 were borrowed from the Library of Congress, a decrease of 45 as compared with the number of the previous year. Interlibrary loans to the Library from libraries outside of Washington were granted

by 36 libraries and totaled 89, an increase of 12 over the previous year. No record is kept of the number of books lent to other libraries in Washington.

BIBLIOGRAPHICAL WORK

In the Bureau of Agricultural Economics library the following additions were made to the mimeographed series of Agricultural Economics bibliographies:

No. 1. Agricultural economics. A selected list of references. Compiled by Mary G. Lacy. Revised. January 1934. 20 pp.

No. 47. Farm mortgages in the United States. Selected references to material published January 1928-April 1933. Compiled by Katherine Jacobs. 1933. 86 pp.

No. 48. Price analysis. Selected references on supply and demand curves and related subjects. Compiled by Louise O. Bercaw. September 1933. 98 pp. The first section of this bibliography was revised and, with additions, is to appear in an early number of *Econometrica*.

No. 49. Rumania; a guide to official statistics of agriculture, population, and food supply. Part 1. An annotated list of official publications, compiled by A. M. Hannay. . . . Part 2. Methods of collection and analysis of official statistics, by J. D. Black and Constantin Ladas for the Bureau of International Research of Harvard University and Radcliffe College. October 1933. 210 pp.

No. 50. Agricultural relief; a selected and annotated bibliography. Compiled under the direction of Margaret T. Olcott, acting librarian. August 1933. 382 pp.

No. 51. Business and agriculture, 1920-1933. A partial bibliography of material on the interdependence of business and agriculture. Compiled by Vajen E. Hitz. November 1933. 155 pp.

No. 52. The American farm problem. A selected list of books and pamphlets on the economic status of the farmer and measures for his relief since 1920. April 1934. 17 pp.

No. 53. State measures for the relief of agricultural indebtedness, 1933 and 1934. Compiled by Margaret T. Olcott and Louise O. Bercaw. 1934.

A Bibliography on Land Settlement with Particular Reference to Small Holdings and Subsistence Homesteads, compiled by Louise O. Bercaw, A. M. Hannay, and Esther M. Colvin, was sent to the printer in February and is to appear as Miscellaneous Publication No. 172.

In the Bureau of Dairy Industry library work was continued on the revision of Bibliographical Contribution No. 6 entitled "Partial List of Publications on Dairying Issued in the United States." Dairy Library List No. 3, entitled "Publications Relating to Ice Cream", was revised, and the unnumbered list of available publications relating to dairying was revised twice during the year.

In the Bureau of Entomology library work was continued on Index V to the Literature of American Economic Entomology. Approximately 26,000 references were added during the year.

The Office of Experiment Stations library has continued to prepare the monthly list of extension publications. Beginning with July 1933, this has been published in *Agricultural Library Notes*. The indexing of the periodical articles written by State experiment station workers and published in outside journals was continued. In the past fiscal year there have appeared 1,373 such articles in approximately 63 scientific journals and proceedings of scientific societies. Beginning with September 1933, the list of these articles has also been published in *Agricultural Library Notes*. The sixth supplement to Department Bulletin 1199, List of Bulletins of the Agricultural Experiment Stations for the Calendar Years 1931 and 1932, compiled by Catherine E. Pennington last year, was issued in March 1934 as Miscellaneous Publication No. 181.

In the Forest Service library two bibliographies were compiled and mimeographed, namely, one on the Ponderosa Pine, 17 pages, 1934, and one on Forest Pruning, 6 pages, 1934.

In the Bureau of Plant Industry library, the Bibliography of Plant Genetics to 1930, compiled by Marjorie F. Warner, Esther M. Colvin, and Martha A. Sherman, which was completed in the fiscal year 1932, was issued in May 1934 as Miscellaneous Publication No. 164. It contains 552 pages. Work on the list of world floras was continued. This is a joint publication of Sidney F. Blake, of the Office of Botany, and Alice C. Atwood, of the library of the Bureau of Plant Industry. Work on the Check List of Early Horticultural Literature, compiled by Marjorie F. Warner, chiefly between the years 1915 and 1920, as a project of the Office of Botany, has recently been continued. During the past year nearly three-fourths of the material has been condensed and edited with the assistance of Janice S. Brown and has been put into shape for possible future publication. It includes sixteenth, seventeenth, and eighteenth century works on horticulture in all aspects, and those containing appreciable contributions in that field or in that of the history of cultivated plants. It is supplemented by bibliographical data in regard to many titles

and critical studies on the identity and relationship of a number of anonymous and obscure publications.

The following current-literature lists were continued during the year: Agricultural Economics Literature, by the Bureau of Agricultural Economics library; Agricultural Engineering Current Literature, by the Bureau of Agricultural Engineering library; Agronomy Current Literature and Botany Current Literature, by the Bureau of Plant Industry library; Cotton Literature, by the Division of Cotton Marketing library, Bureau of Agricultural Economics; Entomology Current Literature, by the Bureau of Entomology library; and Highways Current Literature, by the Bureau of Public Roads library. Forestry Current Literature, a list of all references, including new books, on forestry and allied subjects indexed in the Forest Service library, is again being issued regularly, as a bimonthly. As no issues were published during the period elapsing between the death of the former librarian of the Forest Service, Helen E. Stockbridge, in December 1932, and the appointment of her successor in September 1933, an attempt was made to bring the indexing up to date in two issues as follows: October 1932 to June 1933, and July to December 1933. In 1934 a new series was begun (n. s., vol. 1, no. 1) covering January and February 1934.

The publication of Agricultural Library Notes, which it was necessary to discontinue temporarily with the issue for June-October 1932, volume 7, nos. 6-10, due to the restricted amount of mimeographing paper which could be used in the fiscal year 1933, was resumed with the July 1933 number, volume 8, no. 1. Its character has been somewhat changed as it is now largely made up of bibliographical lists, although at least 1 or 2 articles are included in each issue. One of the important library lists formerly issued each week in the Official Record was a selected list of the principal library accessions. When the Official Record was discontinued in July 1934, it was decided to include the latter list monthly in Agricultural Library Notes. The list of State extension publications and the list of publications by Department workers issued outside of the Department, both of which were formerly issued in the Official Record, are also included now in Agricultural Library Notes, but not the list of State agricultural experiment station publications, as this is published monthly in separate form. At the request of the Office of Experiment Stations, a new list has since been added as a regular feature of Agricultural Library Notes, namely, the list of articles by State agricultural experiment station workers.

LEGISLATIVE WORK

Legislative reference work, which is one of the important Library activities, particularly of the libraries of the Bureaus of Agricultural Economics, Agricultural Engineering, and Public Roads, has been exceptionally heavy during the past year, due to the fact that in addition to the usual material on Department appropriations there has been much legislation on various reclamation projects, river surveys, roads, land utilization, public control of agricultural surpluses, public works, and other relief measures. In the libraries of the bureaus mentioned the Congressional Record was scanned daily for items of interest, copies of the bills of interest were obtained and filed, and also copies of the hearings on them. In the Bureau of Agricultural Economics library a daily index of items of interest to the Bureau was continued during the sessions of Congress and distributed to bureau officials.

EXCHANGES

During the year 804 orders were issued on the Office of Publications for the mailing of Department publications requested by foreign institutions and officials and by societies and private individuals from whom publications are received in exchange. This was a decrease of 169 from the number the previous year.

The revision of the foreign mailing lists maintained by the Library, which was begun in June 1932, was completed during the year, and also the revision of the record of exchanges received from the institutions and individuals on the mailing lists.

CIVIL WORKS ADMINISTRATION PROJECTS

Under a project entitled "Rehabilitation of Books", funds were allotted to the Library by the Civil Works Administration for the employment of 12 workers, beginning December 14, 1933. Two of these workers obtained perma-

nent appointments in other Government offices before the expiration of the period of their appointments under the Civil Works Administration. Of the remaining 10, 5 left on April 17 and 5 on April 28, in accordance with instructions from the Civil Works Administration. The following is a brief summary of the work accomplished: (1) Cards were made for the bulletins of the following State agricultural experiment stations: New York State, Cornell, Ohio, and Wisconsin. Manuscript cards for these station bulletins have been placed in the Library catalog, and a copy of each has been kept so that they are available for printing later if the Library of Congress should think it advisable to print them; (2) cards were made for 3,474 reprints which had been accumulating for several years. The languages of the reprints for which cards were made were as follows: Bohemian, 24; Danish, 4; Dutch, 70; French, 192; German, 584; Hungarian, 13; Italian, 55; Japanese, 15; Norwegian, 23; Polish, 31; Portuguese, 5; Russian, 13; Spanish, 14; Swedish, 19; English, 2,412; (3) practically all the shelves were read, and the files of charges at the loan desk were read to ascertain whether any cards were out of place. The collection of farm-bureau publications was arranged, and also the second set of experiment-station publications; (4) approximately 4,000 leather-bound volumes were oiled; (5) 2 of the workers helped in the miscellaneous work connected with the binding drive by removing staples and advertising pages, making book cards, and pasting labels.

In the Bureau of Agricultural Economics library 4 workers appointed under Civil Works Administration funds worked on the compilation of 2 indexes, 1 an index to the sources of statistics of consumption of fruits and vegetables, and the other an index to the sources of prices of movements of fruits and vegetables as found in periodicals.

The Forest Service library had the assistance of 10 workers. The shelves were read and labeled, the books cleaned, the book charges checked, and the magazine routing list partially revised. In addition, the library rooms were renovated.

Without exception, these workers did their work well and conscientiously, and took great interest in it.

In connection with the Civil Works Administration projects, mention should also be made of the translating project carried on by the Division of Forest Pathology of the Bureau of Plant Industry and a project of the Bureau of Chemistry and Soils concerned with the investigation of soil-binding plants. The translators did a large part of their work in the Library as it was necessary for them to use the dictionaries and other reference books in the reference room. Those engaged in looking up material on soil-binding plants made great use of the botanical catalog.

LIBRARY STAFF

In the Library, 34 permanent employees were carried on the rolls at the close of the fiscal year, and 64 by the bureau and office libraries, making a total of 98, a decrease of 6 as compared with the number in 1933. Of this number, 15 were in administrative positions (including the Librarian of the Department, the heads of divisions in the Library, and the librarians of the bureaus), 50 were assistant librarians, junior librarians, library assistants, and junior library assistants, 10 were under and minor library assistants, 16 were clerical assistants, 1 was a translator, and 6 were messengers.

In the main Library there were 2 resignations and 4 transfers during the year. With one exception all were in the subprofessional or custodial grades. The exception was Mrs. Lois B. Payson, whose services the Library unfortunately lost when she resigned on October 14, 1933, to become librarian of the Montana State College.

The Bureau of Agricultural Economics library lost three clerical assistants through transfer to the Agricultural Adjustment Administration, and the Office of Experiment Stations a library assistant under the marital clause of the Economy Act. The Bureau of Plant Industry library lost two assistants, one a clerical assistant, by resignation, and the other the assistant librarian of the Bureau, by retirement. In the retirement of Marjorie F. Warner, the assistant librarian of the Bureau of Plant Industry, the Library as a whole has suffered a very severe loss. She had been with the Department for 34 years, first in the Library, then in the Division of Botany, and since 1926 as bibliographer (assistant librarian) of the Bureau of Plant Industry. For the past 20 years or more she has specialized in botanical and horticultural litera-

ture and has been of the greatest assistance in the building up of the botanical and horticultural collections and in the development of the botanical catalog of the Bureau of Plant Industry.

The position of librarian of the Forest Service, made vacant by the death of the former librarian, Helen E. Stockbridge, on December 20, 1932, was filled in September 1933, by the transfer of Helen Moore from the Forest Service regional library in San Francisco, where she had served as librarian for 2½ years. Before taking up her duties in the Forest Service library she worked for 2 weeks in the main Library in order to familiarize herself with the general resources and records of the Library.

Staff meetings were held each month from October 1933 to May 1934. At these meetings, with the exception of the first, talks were given by officials of the Department, including the Assistant Secretary, the newly appointed Chief of the Bureau of Biological Survey, the Assistant Chief of the Food and Drug Administration, and the administrative assistant to the Administrator of the Agricultural Adjustment Administration. The staff organ, the Newsletter, was issued from October 1933 to June 1934.

At the annual conference of the American Library Association in Chicago, in October 1933, the Library was represented by the Librarian of the Department, the librarians of the Bureau of Dairy Industry, Bureau of Plant Industry, Bureau of Entomology, and the Office of Experiment Stations, the assistant reference librarian of the Library, and an assistant from the Bureau of Agricultural Economics library. At this meeting the librarian of the Bureau of Plant Industry served as secretary of the agricultural libraries section. At the annual meeting of the association in Montreal, June 25-30, 1934, the Library was represented by the Associate Librarian of the Department, the librarian of the Bureau of Plant Industry, the librarian of the Office of Experiment Stations, and the assistant in charge of the loan desk of the Bureau of Agricultural Economics. The librarian of the Office of Experiment Stations served as secretary of the agricultural libraries section. The Special Libraries Association meeting was attended by the librarian of the Division of Cotton Marketing, Bureau of Agricultural Economics, and the assistant in charge of the loan desk of the Bureau of Agricultural Economics.

LIBRARY QUARTERS

The contract for the new library stacks was awarded by the Treasury Department in December 1933, but work on the erection of the stacks could not be begun until after the close of the past fiscal year as the stack space was occupied by the Contract Record Section of the Agricultural Adjustment Administration and could not be vacated on account of the difficulty of finding other office space for this unit. Space having finally been found for it in the old Post Office Building, the moving of the unit was begun June 30, and completed the following day. This made it possible for the stack contractor to begin work a few days later, and it is now confidently expected that the stacks will be completed in November. It is also hoped that the books can be moved to the stacks by the end of the calendar year.

In April 1934 the Library received a grant of \$3,000 from the Public Works Administration for the erection of 2 passageways into the stacks, 1 on the east side leading from the Periodical Division, and 1 on the west side, leading from the reference room. Work on these was begun on May 28, 1934. They will save much time in getting books to and from the stacks and in addition will make it unnecessary for the book trucks to go through the public catalog room.

BUREAU AND DIVISION LIBRARIES

A list of the branch libraries in the various bureaus and offices and data in regard to them is given in table 2. Cataloging statistics are included in the paragraph above entitled "Cataloging and Classification." Statistics of circulation are given in table 1. Other activities are described in the body of the report under their appropriate headings.

For the Bureau of Agricultural Economics Library, the past year has been one of the most difficult in its history because of the volume of the work required of it and the rush nature of the requests. Several bibliographies were prepared under great pressure, particularly those on Agricultural Relief, Business and Agriculture, and Farmers' Strikes and Riots, which were requested on

August 5 and completed on August 16 for use in connection with an agricultural test case in the courts.

The work of the Office of Experiment Stations library was severely handicapped during the year by the moving of the administrative and editorial force of the office temporarily to wing 6 of Building C. On account of the expense involved, the library was not moved. Much more time was therefore required in getting the books and periodicals to and from the offices in Building C, and this also increased the work of the main Library.

In the Forest Service library the present librarian, Helen Moore, took charge on September 25, 1933. Additional temporary assistants appointed under a C. W. A. grant made it possible during the year to put the library in much better physical condition. The walls were renovated, the books on the shelves were arranged in better order, needed filing cabinets were purchased, and some temporary shelving also provided to relieve the crowded condition of the shelves.

For all the other bureau libraries, the past year has been an unusually busy one, but their work was carried on along the same lines as in previous years.

The completion of the sixth and seventh wings of the South Building made it necessary toward the end of the past fiscal year to consider permanent plans for the libraries connected with the bureaus to be moved to the South Building. The libraries involved in the moving plans were those of the Bureau of Agricultural Economics, the Bureau of Agricultural Engineering, the Bureau of Dairy Industry, the Bureau of Entomology, and the Bureau of Plant Industry. In a mimeographed statement in regard to the centralization of the library collections, presented to the bureau chiefs on April 13, 1934, certain definite recommendations were made, namely, that these libraries be placed on the first floor with the main Library, in as advantageous locations as possible, and that they be administered as special reference services for the subjects they cover. In addition, it was recommended that the bureau personnel now in charge of these collections continue to have charge of them, and that their salaries continue to be paid by the bureaus, just as in the past. According to this general plan it would be possible this year, after the completion of the stacks, to have special rooms and special reference services for botanical literature, entomological literature, dairy literature, agricultural engineering, and agricultural economics literature. To sum up the matter, the plan proposed was an attempt to combine as many as possible of the undoubted advantages of the special reference services of the bureau and office libraries with the advantages also of centralized collections, as it is believed that this arrangement would improve the general reference service of the Library.

The Bureau of Plant Industry has been in accord with the plan described above ever since the consolidation of its collections with the Library in 1923, and space for the library personnel of the Bureau has already been assigned in rooms 1057 to 1069, adjoining the Library along the north corridor. Just at the close of the fiscal year the Bureau of Dairy Industry and the Bureau of Entomology also agreed to having their libraries moved to the first floor adjoining the quarters of the Library, the Bureau of Entomology library to be located in the middle portion of the east side of the fourth wing, and the Bureau of Dairy Industry library to be located in rooms on the north corridor opposite the rooms of the Bureau of Plant Industry library. Plans for the two other libraries of bureaus concerned in moves to be made this year, namely, the Bureau of Agricultural Economics library and the Bureau of Agricultural Engineering library, were still in abeyance at the close of the fiscal year.

A further problem in regard to the branch library service has been brought to the fore in the past year in connection with the plans of the Department for developing a research center at Beltsville, Md. Unquestionably, a special library service will be needed for the large group of workers who are to be located at this place. As these workers will be employed by several different bureaus, the organization of the library service will necessarily be on a different basis from other branch libraries, all of which heretofore have been on strictly a bureau basis, or in other words, as separate reference services for the special subjects dealt with by the various bureaus. They correspond in many respects with the departmental libraries in universities. In the case of the Beltsville station, it is recommended that the library service be organized as a branch of the Library, not on one subject but to serve all of the various units which are located at Beltsville. Thus, though its collections would be scientific and technical in character, in its organization it would correspond more with branches of public libraries which are organized to serve the various communities of a city.

TABLE 1.—Combined statistics of circulation, 1933 and 1934

Bureau or office library	Number of books circulated								Current periodical circulation		Number of borrowers in 1934
	To individuals		To Library		To branch libraries		Total				
	1933	1934	1933	1934	1933	1934	1933	1934	1933	1934	
Main Library.....	20,364	19,479			34,011	30,918	54,375	50,397	(1)	(1)	
Agricultural Economics.....	18,100	18,147	1,238	1,358	317	347	19,655	19,852	(1)	(1)	441
Division of Cotton Marketing.....	(1)	3,697	(1)		(1)		(1)	3,697	(1)		42
Agricultural Engineering.....	1,617	1,672	154	201	57	48	1,828	1,921	12,005	12,016	64
Animal Industry.....	3,143	3,657	284	300	134	137	3,561	4,094	42,810	46,461	77
Animal Husbandry Division.....	(1)	1,446	(1)	118	(1)	22	(1)	1,586	(1)	9,400	74
Chemistry and Soils.....	6,166	6,222	850	979	54	80	7,070	7,281	44,868	47,272	377
Fertilizer Investigations.....	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	2,090	86
Dairy Industry.....	2,004	1,948	77	133	32	53	2,113	2,134	27,455	26,763	77
Entomology and Plant Quarantine.....	3,938	3,050	618	473			4,556	3,523	7,628	6,979	100
Division of Bee Culture.....	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	35
Experiment stations.....	2,433	1,558	(1)	(1)	(1)	(1)	2,433	1,558	26,986	24,994	122
Forest Service.....	2,540	2,891	691	593	13	63	3,244	3,547	6,470	6,780	
Home Economics.....	4,406	3,578	431	511			4,837	4,089	14,403	12,958	76
Plant Industry.....	(2)	(2)	(2)	(2)	(2)	(2)	(2)	34,927	32,982		(2)
Public Roads.....	3,549	3,585	1,584	1,187			5,133	4,772	11,883	8,210	158
Total.....	68,260	70,930	5,927	5,853	34,618	31,668	108,805	108,451	229,435	263,200	

¹ Figures not available.

² The Bureau of Plant Industry library does not maintain a collection of books as it is in close proximity to the main Library. The circulation of books to members of the Bureau is therefore included with those for the Library, but circulation figures are available for current periodicals, as this circulation is handled in the Bureau of Plant Industry library.

TABLE 2.—Statistics of bureau libraries ¹

Bureau or office library	Em- ploy- ees	Books	Pam- phlets	Period- icals cur- rently received	Regis- tered borrow- ers	Regis- tered borrowers to whom periodi- cals are circulated	Shelv- ing	Space occu- pied
	Num- ber	Number	Number	Number	Number	Number	Linear feet	Square feet
Agricultural Economics.....	20	² 66,791		1,960	441	144	4,659	4,790
Division of Cotton Marketing.....	2	605	(2)	237	42	41	56	576
Agricultural Engineering.....	1	2,805	³ 7,000	240	64	31	336	684
Animal Industry.....	3	(4)	(4)	637	77	77	119	540
Animal Husbandry Division.....	1	5,126	5,660	274	74	42	746	630
Chemistry and Soils.....	4	11,952	(4)	626	377	159	1,770	1,000
Fertilizer Investigations.....	1	⁴ 4,500	(4)	120	86	48	623	1,260
Dairy Industry.....	4	1,364	³ 5,300	370	77	70	180	400
Entomology and Plant Quarantine.....	3	11,178	14,020	950	100	42	1,733	2,240
Division of Bee Culture.....	1	2,200	700	80	35	12	342	400
Experiment Stations.....	7	4,466	85,158	1,079	122	65	1,587	2,650
Forest Service.....	1	² 28,106		109	426	79	1,425	1,051
Home Economics.....	2	4,507	(4)	286	76	54	685	736
Plant Industry.....	9	⁶ 620	610	638		192	140	650
Public Roads.....	4	13,742	21,297	326	158	158	1,499	1,559
Solicitor's Office.....	1	⁵ 6,600		(4)	(4)	(4)	1,330	1,214

¹ The Weather Bureau Library is administered separately, with the exception that the books and periodicals are purchased from the appropriation of the library of the Department, the sum of \$1,000 being set aside each year for this purpose.

² Includes pamphlets.³ Approximate figures.⁴ Figures not available.⁵ Does not maintain a collection of books.

SUPPLIES AND REPAIRS

Supplies:										
Cleaning and toilet.....	\$70.45	\$109.31	\$124.22	\$104.76	\$107.02	\$95.07	\$84.34	\$87.10	\$367.62	\$104.00
Stationery.....	55.16	-----	257.85	107.11	208.97	214.74	248.22	385.71	186.64	137.16
Miscellaneous office.....	302.53	291.99	289.02	488.76	76.74	289.19	280.04	289.03	165.95	300.06
Binding material.....	73.59	73.10	95.91	49.38	126.32	109.47	39.13	100.93	17.41	28.50
Total.....	501.73	474.40	767.00	750.01	707.35	708.47	651.73	944.77	737.62	629.72
Repairs:										
Carpentry work.....	124.24	151.52	57.49	65.43	160.74	188.13	68.88	903.72	2,359.24	44.34
Electrical work.....	189.95	43.52	60.04	31.46	191.04	241.12	43.90	37.55	123.90	57.42
Typewriters.....	104.74	86.38	48.00	20.92	27.19	15.43	25.45	36.31	73.39	34.36
Painting.....	42.55	142.58	120.91	135.05	186.59	124.30	14.38	129.29	496.76	-----
Miscellaneous.....	81.80	70.94	68.80	74.13	76.18	393.94	76.43	94.91	107.80	31.12
Total.....	513.28	497.44	355.24	326.99	641.74	962.92	228.64	1,831.78	3,223.09	167.24

¹ The appropriation for 1934 was \$100,223, but the amount which the Library could withdraw from the Treasury in payments during the fiscal year 1934 was limited by the Bureau of the Budget to \$88,901.

² Outstanding liabilities for books, periodicals, and serials, \$161.29.

REPORT OF THE DIRECTOR OF PERSONNEL AND BUSINESS ADMINISTRATION, 1934

UNITED STATES DEPARTMENT OF AGRICULTURE,
OFFICE OF PERSONNEL AND BUSINESS ADMINISTRATION,
Washington, D. C., September 28, 1934.

SIR: I submit herewith the report of the work of the Office of Personnel and Business Administration for the fiscal year ended June 30, 1934.

Respectfully,

W. W. STOCKBERGER, *Director.*

Hon. HENRY A. WALLACE,
Secretary of Agriculture.

INTRODUCTION

In preparing the accompanying report an effort was made to present as concisely as possible the major activities of the year. Much might be said of the constant, unselfish service of the employees who have had to meet almost unprecedented demands upon their energy and ability. The Office has cooperated with the Agricultural Adjustment Administration to the fullest extent in the work incident to building up the staff of that organization and in providing for its housing.

The work of the Office is set forth under the individual divisions.

BRANCH OF PERSONNEL

DIVISION OF APPOINTMENTS

APPOINTMENTS, SEPARATIONS, AND PROMOTIONS

On June 30, 1934, there were 38,623 persons under appointment in the Department, as compared with 26,544 at the close of the fiscal year 1933, an increase of 12,079 employees. This large increase in the personnel of the Department is due to a gain of 5,020 employees in the Agricultural Adjustment Administration, which was organized May 12, 1933, and increases on account of the allotments of emergency appropriations from the Public Works Administration, the Civil Works Administration, and for the emergency conservation work. Personnel data for the last 4 years are shown in table 1.

TABLE 1.—*Personnel activities of the Department of Agriculture, 1931, 1932, 1933, and 1934*

Year ended June 30	Employees on rolls of Department			Field stations	Employees appointed	Separations from the Department
	Departmental service	Field service	Total			
1931.....	5, 639	22, 524	28, 163	1, 451	10, 258	7, 836
1932.....	5, 664	¹ 21, 764	27, 428	1, 451	6, 612	7, 425
1933.....	5, 521	² 21, 023	26, 544	1, 451	3, 915	4, 721
1934.....	10, 032	³ 28, 591	³ 38, 623	1, 451	⁴ 31, 434	⁵ 19, 355

¹ Includes 78 in foreign service.

² Includes 80 in foreign service.

³ Includes 5,132 in Agricultural Adjustment Administration.

⁴ Includes 11,667 in Agricultural Adjustment Administration.

⁵ Includes 6,647 in Agricultural Adjustment Administration.

In addition to the above number there were 969 collaborators serving without compensation on June 30, 1934. The largest number of employees previously in the Department was during the World War period, the total being 25,239 on July 1, 1918.

The Department personnel experienced a turnover of 10.63 percent during the fiscal year 1934 as compared with 3.88 percent during the fiscal year 1933, 5.98 percent during 1932, 7.95 percent during 1931, and 9.79 percent during 1930.

The number of appointments during the fiscal year 1934 was 700 percent more than the number appointed in 1933, while the number of separations was 310 percent more than in 1933. There were 914 changes of assignments involving promotions of employees to fill vacancies in higher grades in 1934 in comparison with 139 in 1933. The so-called "administrative promotions," i. e., promotions within the grade, were prohibited by the Economy Act of June 30, 1932.

Authorities were obtained from the President to fill 5,023 positions in the Department of Agriculture during the fiscal year.

During the year 254 formal applications for positions were received and circulated throughout the Department, as compared with 144 during the fiscal year 1933.

RECORD OF LEAVE

As indicated in the report for last year, statistics for leave during the calendar year 1932 were not available because of legislation changing the procedure of granting annual leave. However, statistics for sick leave for the calendar year 1932 have been compiled. During this year employees were entitled to annual leave from January 1 to June 30. From July 1 to December 31, leave other than sick was charged to the legislative furlough without pay. It may be interesting to note whether or not the changing of the annual leave during this year had any effect upon the amount of sick leave taken. The records show that during the last 8 years men and women working for the Department in Washington took an average of 7.5 days sick leave. For the year 1932 the employees used 7.8 days of sick leave on the average.

In the field, where the limit of sick leave was 15 days, the 8-year average of sick leave taken by the men and women combined is only 3 days, while for 1932 the leave taken was the same as the 8-year average.

Contrary to the common report that Government employees in Washington take 30 days sick leave each year, it is found that during the last 8 years 27 percent of the employees of the Department did not take any sick leave while only 5.6 percent took the full amount of 30 days. In the field 52 percent of the employees took no sick leave, while only 6.7 percent took the maximum of 15 days.

WORK INCIDENT TO APPOINTMENTS, TRANSFERS, AND PROMOTIONS

Personnel changes in the Department necessitated contacts with the Civil Service Commission, and certificates and authorizations were obtained as indicated in table 2.

TABLE 2.—*Personnel changes in the Department of Agriculture, 1931, 1932, 1933, and 1934*

Item	1931	1932	1933	1934
Certificates from register.....	1, 420	702	74	1, 510
Reinstatement certificates.....	385	212	27	481
Certificates for change in status.....	619	194	108	254
Transfer certificates.....	289	165	69	465
Authorities for temporary appointments.....	762	462	94	4, 848
Authorities for extensions of temporary appointments.....	432	443	66	4, 031
Authorities for extensions of suspensions.....	11	6	6	3
Civil Service examinations requested.....	132	26	7	29

RETIREMENT RECORDS

During the past fiscal year 259 employees were retired in accordance with the Retirement Act.

Figures showing retirements for the past 4 years are shown in table 3, and the average annuities paid in the various groups are shown in table 4.

TABLE 3.—*Number of employees retired, 1931, 1932, 1933, and 1934*

Year ended June 30	Annuity retirements in class				Disability retirements in class				Cases disposed of
	Professional	Sub-professional	Clerical, administrative, and fiscal	Custodial	Professional	Sub-professional	Clerical, administrative, and fiscal	Custodial	
1931.....	36	88	20	27	7	17	20	3	307
1932.....	22	41	13	9	8	17	8	10	378
1933.....	81	132	22	28	9	23	19	15	329
1934.....	51	63	58	24	12	12	28	11	259

TABLE 4.—*Averages of the annuities in the various groups, 1931, 1932, 1933, and 1934*

Group	1931	1932	1933	1934
Professional and scientific.....	\$1, 006. 77	\$1, 100. 77	\$1, 114. 04	\$1, 102. 22
Subprofessional.....	926. 61	972. 67	1, 012. 91	946. 81
Clerical, administrative, and fiscal.....	907. 88	981. 88	963. 67	946. 83
Custodial.....	749. 42	698. 57	695. 98	757. 72

Continuances in the service, which require the approval of the President, were practically eliminated by the Economy Act of June 30, 1932. Only two extensions beyond the retirement age were granted this consideration during the fiscal year, one for the Chief of the Bureau of Plant Industry for 6 months, and the other for the Chief, Division of Soil Survey, in the Bureau of Chemistry and Soils for 1 year.

TABLE 5.—*Number of employees who received continuances after reaching retirement age, 1931, 1932, 1933, and 1934*

Year ended June 30	Extensions					
	First	Second	Third	Fourth	Fifth	Sixth
1931.....	53	29	3	1	2	1
1932.....	60	35	1	0	0	0
1933.....	1	2	1	0	0	0
1934.....	2	0	0	0	0	0

The scope of the retirement work has greatly widened during the fiscal year and apparently will continue to do so. This is due partly to the new civil service retirement system which requires a monthly statement of the retirement deductions to the credit of the employees who are appointed and separated, and an annual report of the total amount of retirement deductions, deposits, and redeposits, by bureaus.

OFFICE OF CLASSIFICATION

By virtue of an act of Congress (Title 1, Public, No. 10, 73d Cong.; approved May 12, 1933), the Agricultural Adjustment Administration was created. Under the terms of this act the Secretary of Agriculture was authorized to appoint such officers and employees, according to the terms of the Classification Act of 1923 and its amendments, and such experts as were necessary to execute the functions vested in him under the act.

As only 32 positions were termed expert, out of approximately 5,000, the creation of this Administration has greatly increased the classification work of the Department. It became necessary after several months of operation to place a departmental representative in the Agricultural Adjustment Administration with authority to investigate positions and prepare classification sheets for

presentation to the central office under the Director of Personnel. In this connection the Civil Service Commission rendered hearty cooperation.

During the fiscal year a number of reorganizations and readjustments of personnel within bureaus took place, and a vast number of positions in the field service were established, payable from emergency funds, which positions were allocated by this office in accordance with the terms of Executive Order No. 6440, dated November 18, 1933, and subsequent decisions of the Comptroller General.

A summary of this activity over the past 4 years is given in table 6.

TABLE 6.—*Appointments and changes in status of employees of the Department of Agriculture, 1931, 1932, 1933, and 1934*

Year ended June 30—	Appoint- ments to new posi- tions	Changes in duties	Changes to vacancies	Appeals	Total
1931.....	545	430	979	110	2,064
1932.....	187	320	725	23	1,255
1933.....	¹ 246	143	104	5	498
1934.....	² 5,561	³ 1,274	⁴ 2,329	15	9,179

¹ 170 positions were allocated during June 1933 in the Agricultural Adjustment Administration.

² 4,751 positions were allocated in the Agricultural Adjustment Administration.

³ 728 positions were allocated in the Agricultural Adjustment Administration.

⁴ 1,964 changes were made in the Agricultural Adjustment Administration.

BRANCH OF BUSINESS AND FISCAL OPERATIONS

THE DEPARTMENT BUDGET

Funds made available to the Department of Agriculture for all purposes during the fiscal year 1934 totaled \$1,243,547,402. The items are summarized in table 7. The increase in funds, as compared with the fiscal year 1933, was due to emergency, relief, and other recovery measures, the regular funds of the Department having been reduced, as shown by tables 7, 8, and 9.

TABLE 7.—*Department of Agriculture appropriations for fiscal years 1933 and 1934*

Item	1933	1934
Regular appropriations:		
All objects except road construction.....	\$78,095,537	¹ \$72,216,584
Road funds.....	108,905,000	39,457,400
Total.....	187,000,537	111,673,984
Emergency appropriations and allotments:		
Road funds.....	132,000,000	437,791,725
Agricultural Adjustment Administration.....		647,135,000
Public Works allotments (exclusive of road funds).....		25,026,363
Civil Works projects (supervisory allotments).....		885,330
Emergency conservation work.....		21,035,000
Total.....	132,000,000	1,131,873,418
Grand total.....	319,000,537	1,243,547,402

¹ Expenditures limited to \$64,248,777.

An analysis of these funds is shown in tables 8 and 9.

TABLE 8.—*Detailed statement of regular Department of Agriculture funds for fiscal years 1933 and 1934*

Activity	1933 appro- priation	1934	
		Total appro- priation	Expenditure limitation
Ordinary activities:			
Office of the Secretary	\$1, 206, 547	\$1, 181, 857	\$806, 639
Office of Information	1, 335, 800	1, 226, 287	999, 130
Library	106, 100	100, 223	85, 976
Office of Experiment Stations (exclusive of payments to States)	294, 294	226, 961	203, 245
Extension Service (exclusive of payments to States)	1, 688, 170	1, 583, 822	1, 215, 578
Weather Bureau	4, 164, 038	3, 731, 235	2, 961, 459
Bureau of Animal Industry	15, 324, 947	14, 398, 524	11, 906, 534
Bureau of Dairy Industry	717, 448	655, 130	550, 150
Bureau of Plant Industry	4, 268, 974	3, 884, 222	3, 294, 377
Forest Service (exclusive of forest roads, payments to States, forestry receipts and special funds, and forest-fire deficiency)	10, 780, 924	9, 952, 610	7, 792, 447
Bureau of Chemistry and Soils	1, 925, 080	1, 766, 458	1, 500, 197
Bureau of Entomology and Plant Quarantine ¹	5, 623, 725	4, 984, 415	3, 747, 685
Bureau of Biological Survey	1, 756, 177	1, 356, 280	1, 079, 918
Bureau of Agricultural Engineering	618, 690	508, 206	424, 351
Bureau of Agricultural Economics	6, 813, 350	6, 232, 703	4, 970, 529
Bureau of Home Economics	233, 365	212, 749	173, 116
Grain Futures Administration	218, 838	200, 000	176, 520
Food and Drug Administration	1, 716, 167	1, 589, 505	1, 510, 679
Total	58, 792, 634	53, 791, 187	43, 398, 530
Special items:			
Fighting forest fires (deficiency)	1, 000, 000	-----	² 412, 000
Chinch-bug control (Bureau of Entomology and Plant Quarantine)	-----	1, 000, 000	975, 000
Grasshopper control (Bureau of Entomology and Plant Quarantine)	-----	-----	³ 2, 314, 100
Total	1, 000, 000	1, 000, 000	3, 701, 100
Payments to States (exclusive of road funds and forest-receipt funds):			
State agricultural experiment stations for research under Hatch, Adams, and Purnell Acts (Office of Experiment Stations)	4, 374, 000	4, 381, 000	4, 381, 000
State colleges of agriculture for extension work under Smith-Lever and supplemental Acts (Extension Ser- vice)	8, 728, 096	8, 738, 096	8, 738, 096
Forest-fire cooperation (Forest Service)	1, 611, 580	1, 537, 513	1, 567, 683
Cooperative distribution of forest-planting stock (Forest Service)	79, 960	74, 730	56, 130
Total	14, 793, 636	14, 781, 339	14, 742, 909
Forestry receipts and special funds (Forest Service):			
Refunds to depositors	75, 000	75, 000	60, 000
National Forest Reservation Commission expenses	576	3, 600	3, 500
Payments to States and Territories (national-forest re- ceipts fund)	568, 257	650, 861	650, 861
Payments to school funds, Arizona and New Mexico (na- tional-forest receipts fund)	21, 221	28, 456	28, 456
Roads and trails for States (national-forest receipts fund)	500, 000	370, 000	122, 280
Cooperative work (contributed funds)	2, 344, 213	1, 516, 141	1, 516, 141
Total	3, 509, 267	2, 644, 058	2, 381, 238
Total ⁴	78, 095, 537	72, 216, 584	64, 223, 777
Road funds (regular):			
Federal-aid highways	100, 000, 000	35, 000, 000	35, 000, 000
Forest roads and trails	8, 905, 000	4, 457, 400	4, 457, 400
Total	108, 905, 000	39, 457, 400	39, 457, 400
Grand total	187, 000, 537	111, 673, 984	103, 681, 177

¹ In anticipation of the consolidation of the Bureaus of Entomology and Plant Quarantine, July 1, 1934, a rearrangement of funds prior to this date was effected which makes it impracticable to show separately the appropriations of these 2 Bureaus for 1934.

² Made available from unexpended balances of salaries and expenses, Forest Service, 1934.

³ Apportioned for expenditure in 1934 out of \$2,354,893 appropriation provided by Agricultural Appropriation Act, fiscal year 1933, and made immediately available.

⁴ Except road funds.

TABLE 9.—*Detailed statement of emergency funds available to Department of Agriculture for fiscal years 1933 and 1934*

Activity	1933	1934
Road construction:		
Federal-aid highways.....	\$120,000,000	\$400,000,000
Forest roads and trails.....	10,000,000	25,100,000
Public-land highways.....	2,000,000	5,000,000
Special road grants to certain States.....		7,431,000
Miscellaneous road projects.....		260,725
Total.....	¹ 132,000,000	² 437,791,725
Agricultural Adjustment Administration:		
Direct appropriation (available until expended).....		³ 100,000,000
Advances from Treasury for rental and benefit payments, removal of agricultural surpluses, and administration (reimbursable from processing taxes).....		⁴ 490,385,000
Advances from Treasury for tax refunds by Bureau of Internal Revenue.....		⁴ 19,500,000
Allotment under section 220, National Industrial Recovery Act for corn-hog program (rental and benefit payments) and administration of codes.....		⁵ 37,250,000
Total.....		647,135,000
Public Works allotments (exclusive of road funds):		
Miscellaneous funds:		
Physical improvements and control of tree-destroying diseases and insects and injurious rodents in the national forests.....		14,967,745
Physical improvements at department field stations and in the District of Columbia.....		4,650,582
Special projects (control of plant disease and insect pests, construction of erosion-control nurseries, purchase of land for National Arboretum, and spray-residue investigations).....		5,408,036
Total.....		⁵ 25,026,363
Civil Works projects:		
Allotment to Department of Agriculture from Federal Civil Works Administration for supervision of work-relief projects relating to Department's activities.....		885,330
Expenditures for work-relief projects, covering a miscellaneous group of activities affecting many phases of the work of the Department of Agriculture, including statistical and economic studies, pest-control work, physical improvements, etc.....		(⁶)
Total.....		885,330
Emergency Conservation work (authorized by Emergency Conservation Act of Mar. 31, 1933):		
Acquisition of additional forest lands (allotted for direct expenditure by Department of Agriculture).....		⁷ 20,000,000
Purchase and rental of land for wildlife refuges.....		⁸ 1,000,000
Investigations by Bureau of Chemistry and Soils to determine the selenium content of soils in certain areas.....		⁹ 35,000
Civilian Conservation Corps activities on national-forest and other lands under supervisory direction of Forest Service, and certain special projects of other bureaus of Department carried out by C. C. C. enrollees.....		(¹⁰)
Total.....		¹¹ 21,035,000
Grand total.....	132,000,000	1,131,873,418

¹ Emergency Relief and Construction Act of 1932.² Public Works allotments under National Industrial Recovery Act.³ Agricultural Adjustment Act.⁴ Agricultural Adjustment Act; advanced to June 30, 1934.⁵ National Industrial Recovery Act; unobligated balance to continue available in fiscal year 1935.⁶ Total of \$17,902,932 allotted from Public Works funds, made available by National Industrial Recovery Act; expenditures made through State Civil Works Administrations.⁷ Of the \$20,000,000 made available under Executive Order No. 6208, dated July 21, 1933, \$18,965,000 was financed from National Industrial Recovery Act funds and \$1,035,000 from President's \$899,675,000 fund provided by the Emergency Appropriation Act, 1935.⁸ Allocated to Department of Agriculture under Executive Order No. 6724, dated May 28, 1934; financed from National Industrial Recovery Act funds.⁹ Allocated to Department under Executive Order No. 6235, dated Sept. 5, 1933; financed from National Industrial Recovery Act funds.¹⁰ Financed from emergency funds through War Department, which continue available in fiscal year 1935. The Budget schedules show allotments totaling \$66,651,845, including \$36,111,656 for work on national-forest lands, \$37,316,939 on State and private lands, and \$223,200 for work on bird refuges and for special forest-insect and disease-control projects.¹¹ Unobligated balances to continue available in fiscal year 1935.

DIVISION OF ACCOUNTS AND DISBURSEMENTS

During the 11 months ended May 31, 1934, the Division of Accounts and Disbursements disbursed \$354,546,470.77, exclusive of rental-benefit payments under the provisions of the Agricultural Adjustment Act of May 12, 1933. This involved the examination and payment of 331,866 vouchers and pay rolls and the issuance of 1,016,597 checks on the Treasurer of the United States. Compared with the previous fiscal year, the amount disbursed during this 11-month period was \$121,487,407.89 greater than that for the full 12 months preceding, with an increase of 24,605 in the number of vouchers and pay rolls examined and paid, and an increase of 389,035 in the number of checks issued.

The rental-benefit payments under the Agricultural Adjustment Act, amounting to \$249,478,133.42 additional for the 11 months ended May 31, 1934, were made by a specially organized emergency section of the disbursing office, consisting of a large group of temporary personnel carried on the rolls of the Agricultural Adjustment Administration. These payments required the issue of 2,831,919 additional checks, which were prepared on punch-card forms by means of electric tabulating-machine equipment and automatically signed by electrically operated machines with the facsimile signature of the disbursing clerk, superimposed on a protective background of complicated design. This was the first time in the history of Government disbursing work that checks of this type were used and also the first time that the Treasury Department permitted the use of a facsimile signature on Government checks, without manual countersigning by a duly authorized deputy.

A comparison of the number of vouchers paid and checks drawn with the preceding 5 years is shown in table 10.

TABLE 10.—*Number of vouchers paid and checks drawn, fiscal years 1929 to 1934, inclusive*

Fiscal year	Vouchers paid	Checks drawn	Fiscal year	Vouchers paid	Checks drawn
1929.....	292, 947	473, 384	1932.....	393, 480	658, 338
1930.....	333, 059	546, 145	1933.....	357, 261	627, 562
1931.....	¹ 374, 349	¹ 648, 205	1934.....	381, 866	² 1, 016, 597

¹ Exclusive of 89,000 vouchers paid and a like number of checks issued in connection with emergency drought relief and rehabilitation loans to farmers.

² Exclusive of 2,831,919 checks issued for rental-benefit payments under the Agricultural Adjustment Act of May 12, 1933.

The disbursing clerk received from the various bureaus of the Department and deposited in the Treasury to the credit of the proper appropriations and funds or the required general fund revenue accounts, collections of public moneys totaling \$6,402,036.75, exclusive of special deposits of Agricultural Adjustment Act cotton funds placed to his credit directly in the Treasury or Federal Reserve banks instead of being remitted through the disbursing office. The foregoing amount consisted of \$5,484,064.34 in repayments to the proper appropriations or funds and \$917,972.41 in miscellaneous revenues accruing from sales of Government property, services rendered the public, fees for the official inspection, grading, or classification of commodities and from other sources authorized by law. These collections involved the receipt, handling, verification, and posting of 5,366 schedules of collections, comprising 46,340 individual remittances in the form of checks, drafts, money orders, and currency transmitted to the disbursing clerk by the various bureaus of the Department.

The special deposits of Agricultural Adjustment Act cotton funds, mentioned in the preceding paragraph as not being included in the disbursing clerk's regular collection account, amounted to \$140,022,419.54 additional and consisted of: (1) \$55,395,325.82 borrowed from banks and \$3,300,000 borrowed from the Reconstruction Finance Corporation to finance the cotton operations provided for by the act; (2) \$38,944,958.72 borrowed from the Commodity Credit Corporation for making advances to members of the Cotton Producers Pool at the rate of 4 cents per pound on cotton which had been optioned to them by the Government; (3) \$19,018,065 received from the Farm Credit Administration in adjustments on cotton acquired therefrom by the Department; and (4) \$23,364,070 in repayments made by the banks in connection with cotton transactions handled by them for the Secretary of Agriculture.

Under the terms of the Executive order of June 10, 1933, as amended, consolidating all disbursing activities of the Government in the Division of Disbursement, Treasury Department, the disbursing functions performed by the Division of Accounts and Disbursements of the Department of Agriculture were transferred to the Treasury Department on June 1, 1934, together with the personnel engaged in this work and the equipment used therefor. Effective on the same date the departmental accounting functions, previously performed by the Division of Accounts and Disbursements, were transferred to the newly created Office of Budget and Finance.

OFFICE OF ACCOUNTS (OFFICE OF THE SECRETARY)

The Office of Accounts is responsible for the administrative audit and accounting for funds appropriated or otherwise contributed in connection with the broad activities of the Office of the Secretary, the Extension Service, including a large volume of work in connection with the activities covered by allotments of funds from the Agricultural Adjustment Administration, the Office of Information, Grain Futures Administration, and the Office of Experiment Stations. The work necessarily includes continuous study of fiscal procedure, accounting methods, recording and reporting forms, and involves also analyses of results with a view to advancing the adequacy of methods and accomplishment. In addition the Office maintains detailed records of costs by States, activities, and commodities, segregates and reports travel expenses of Washington personnel by States and meetings attended, maintains a record of individual travel expenses classified as to transportation and subsistence expenses and average costs per day of travel, and segregates and reports by classes and bureaus all printing and binding costs for use of administrative officers.

A summary of the routine activities of this Office is shown in tables 11, 12, and 13.

TABLE 11.—*Audit work accomplished, 1931, 1932, 1933, and 1934*

Fiscal year	Claims audited	Purchase orders pre-audited	Contracts audited	Items involved
1931.....	15, 526	5, 869	266	168, 745
1932.....	15, 115	5, 277	226	167, 481
1933.....	14, 482	5, 227	182	120, 406
1934.....	52, 072	8, 293	158	833, 616

¹ Preaudit before release of 5,409 commitments.

The volume of work handled in the administrative audit section increased about 600 percent over 1933 and was greatly complicated by the requirement for segregating and coding all expenditures under agricultural adjustment programs to States, counties, and commodities in addition to the usual objective classification.

TABLE 12.—*Record of pay roll and miscellaneous items, 1931, 1932, 1933, and 1934*

Fiscal year	Pay roll prepared	Pay-roll items	Letters of authorization written	Collection claims filed	Transportation requests issued	Bills of lading issued
1931.....	3, 138	50, 379	635	186	6, 237	1, 918
1932.....	3, 203	51, 802	507	301	5, 785	1, 711
1933.....	3, 434	52, 592	2, 028	293	5, 862	1, 268
1934.....	25, 124	338, 963	9, 959	270	5, 565	1, 935

On the basis of items alone the pay-roll work has increased more than 1,200 percent, but the required segregation of all Extension Service expenditures on agricultural adjustment programs by States, counties, and commodities, and incidental coding, more than trebled the purely statistical increase indicated.

TABLE 13.—*Funds under direct and indirect control of Office of Secretary, 1931, 1932, 1933, and 1934*

Fiscal year	Aggregate amount	Warranted to States	Offset by States	Supplementary State funds
1931.....	\$33,800,259.97	\$13,012,936.00	\$6,192,936.00	\$8,813,102.18
1932.....	34,278,672.98	13,255,717.00	6,774,514.02	9,000,000.00
1933.....	32,092,729.41	13,181,927.71	6,547,090.28	7,204,760.99
1934.....	41,599,128.03	13,119,096.00	6,198,096.00	4,321,958.40

The work in the administrative accounting section for the fiscal year 1934 showed a proportionately larger increase than indicated for other sections due to number and complexity of commodity budgets and necessary elaboration of records to meet the manifold needs of administrators and budget control. Operation on a cash-withdrawal basis together with requirements of the Economy Act relating to vacancies, legislative furlough, and executive salary reductions required the maintenance of special records and an unusual volume of entries under regular appropriations accounts. Activities under Agricultural Adjustment Administration cooperative field programs increased the bookkeeping work to more than 3,000,000 entries for the fiscal year, as against 600,000 in 1933. Financial reports rendered monthly increased from around 70 in 1933 to over 400 in 1934.

Effective July 1, 1933, all expenses in connection with the purchase, storing, and issue of supplies and/or equipment by the Central Supply Section were required to be charged proportionately as a part of the cost of the materials issued or service rendered, and the necessary overhead and collection accounts were organized and have been maintained in addition to the usual stock account.

Due to the transfer, during the year, of the mechanical shops to the Department of the Interior, the cost-accounting work being handled by this Office was discontinued.

DIVISION OF PURCHASE, SALES, AND TRAFFIC

Progress toward centralization of the supply activities of the Department in the Division of Purchase, Sales, and Traffic, which was suspended following the issue of Executive Order No. 6166 of June 10, 1933, establishing a Procurement Division in the Treasury Department with broad powers of general centralization, was resumed during the latter part of the fiscal year 1934, after the general regulations of the Procurement Division had appeared and the policies of that organization had been announced. One more of the larger bureaus of the Department—the Bureau of Plant Industry—was included in the departmental centralization before the close of the year.

Due to the operation of the many emergency agencies of exceptional size and scope created by the President and the Congress, as factors in the general recovery program, a sharp advance in the volume of business in every major activity of the Division occurred. An account of the operations of the Division and a comparison with those of previous years are given in table 14.

TABLE 14.—*Purchases, sales, and other activities of the Division of Purchase, Sales, and Traffic, 1932, 1933, and 1934*

Item	1932	1933	1934
Bid Section:			
Bid transactions.....number..	4,000	2,831	4,122
Flow of bids:			
First quarter.....percent..	24	28	13
Second quarter.....do.....	15	17	28
Third quarter.....do.....	20	20	21
Fourth quarter.....do.....	41	35	38
Bureau purchase orders in excess of \$500 approved			
number.....	129	70	109
Aggregate amount.....dollars..	163,742.53	53,911.66	346,373.57
Forest-road contracts examined prior to approval by			
Secretary.....number.....	65	145	165
Aggregate amount.....dollars..	3,274,854.68	10,761,152.08	12,164,018.13

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TABLE 14.—*Purchases, sales, and other activities of the Division of Purchase, Sales, and Traffic, 1932, 1933, and 1934—Continued*

Item	1932	1933	1934
Definite quantity purchases of auto tires and tubes.....dollars.....	1 94,000.00	66,978.19	315,726.25
Definite quantity purchases of other supplies.....do.....	21,768.33	20,076.66	23,186.61
Value of surplus field property transferred to other departments.....dollars.....	34,875.45	4,670.00	(²)
Value of surplus field property received from other departments.....dollars.....	179,018.40	83,642.00	(²)
Value of District of Columbia property transferred from one bureau to another in Department.....dollars.....	3,000.00	8,400.00	4,027.13
Initial value of worn-out property transferred to General Supply Committee.....dollars.....	20,782.47	57,713.00	26,860.69
Food samples destroyed.....number.....	1,275	2,755	1,997
Traffic Section:			
Freight routing furnished:			
Less than carload.....do.....	³ 4,149	4,001	7,085
Carload.....do.....	³ 205	383	1,337
Rates furnished:			
Freight.....do.....	³ 6,443	6,982	13,363
Express.....do.....	³ 263	186	181
Passenger.....do.....	³ 1,085	987	8,163
Parcel post.....do.....	³ 75	80	11
Air.....do.....	³ 20	50	0
Itineraries furnished.....do.....	³ 134	500	1,043
Central Supply Section:			
Stock issues during year.....dollars.....	254,261.01	154,591.52	355,283.50
Purchase orders issued to maintain stocks.....number.....	1,569	7,079	9,098
Purchase orders for other activities.....do.....	5,174		
Money value involved, all purchase orders.....dollars.....	593,462.00	565,131.44	1,008,110.75
Experimental byproducts sold:			
For deposit to miscellaneous receipts.....do.....	29,292.60	26,555.74	28,798.86
For cooperators.....do.....	2,734.22	767.56	387.29

¹ Estimated.

² Since the Procurement Division took over this item, no record has been kept.

³ Approximate figure.

BID TRANSACTIONS

Heretofore the number of bid transactions has served as a reasonably accurate barometer of this important phase of the Division's business and the distribution of this volume throughout the year. Under the emergency purchasing conditions prevailing during 1934, however, this figure, for the year as a whole nearly 46 percent in excess of that for 1933, tells only a part of the story. So many of the individual procurement transactions involved the purchase of such large quantities of equipment or material that the money amount involved in the average transaction handled by the Division in Washington advanced from \$882.34 in 1933 to \$2,980.83 in 1934. It is of significance, also, that the difficulties attendant upon efficient and expeditious purchasing were increased immoderately by the restrictions of the many N. R. A. codes on both bidders and procurement officers and by the eagerness of bidders for Government business in the absence of normal demands for equipment and material by the general public.

AUTOMOTIVE EQUIPMENT

Congress authorized the Department to expend for the purchase of passenger-carrying vehicles during the fiscal year 1934, \$217,440, but of this authorization more than \$20,000 remained unused at the end of the year. The authorizations carried in the Agricultural Act for 1935 have been further reduced to \$197,860 in the aggregate. Truck purchases during the fiscal year, for use principally by the Forest Service in connection with its emergency conservation work and other emergency projects, resulted in the acquisition of 10,000 or more units, the tire requirements alone of the Department, as shown in the tabular data, rising from approximately \$67,000 in 1933 to \$315,726.25 in 1934.

TRAFFIC ACTIVITIES

The summary of items of current work performed by the Traffic Section (table 14) does not include the requisitioning and distributing of transportation requests and bills of lading, handling telephone calls for information, making out travel requests, purchasing tickets, and other detail of current work. Loss and damage claims have been handled and numerous adjustments made on travel and freight charges.

Substantial savings have been made by this Section in travel accounts by advising and assisting the very large travel personnel of the Department, and by individually planning the order of many field trips to economize both time and travel costs.

Thousands of dollars have been saved in this way by use of excursion tickets with possible side trips that otherwise could not have been collected as suspensions on expense accounts by reason of lack of sequence in the specified dates and places of travel as authorized.

Also, material savings have been effected in freight accounts by use of special emergency rates applying on large quantities of specific commodities moving for the Government, and cooperating with the Traffic Section, Procurement Division, in securing such rates, as, in the shipment of material necessary to meet grasshopper and chinchbug eradication.

SUPPLY WORK

The act making appropriations for the Department of Agriculture for the fiscal year ended June 30, 1934, provides:

The appropriations made hereunder shall be available for the payment of salaries of employees engaged in purchasing, storing, handling, packing, or shipping of supplies and blank forms, and the amount of such salaries shall be charged proportionately as a part of the cost of supplies issued, and in the case of blank forms and supplies not purchased from this appropriation, the amount of such salaries shall be charged proportionately to the proper appropriation.

Under this authorization a surcharge plan was adopted to distribute the cost of operation as equitably as possible among the participating bureaus and offices. Separate surcharges, covering the three major phases of the supply work conducted by the Central Supply Section, were established, namely: Storage and issue, purchasing service, and form handling. During the year the rates shown in table 15 were set on the basis of volume of business and cost of operation.

TABLE 15.—*Rates for surcharge, 1933-34*

Period	Storage and issue	Purchasing service	Form-handling charge per month
	<i>Percent</i>	<i>Percent</i>	<i>Dollars</i>
July 1 to Dec. 31, 1933.....	10	1	300
Jan. 1 to Apr. 30, 1934.....	8	1½	300
May 1 to June 18, 1934.....	7	1	300
June 19 to June 30, 1934.....	7	1¼	300

It is of interest to note that these moderate charges adequately covered all operating expenses of the Central Supply Section, including salaries and wages, trucking expenses, telephone, and other miscellaneous expenses, including the purchase of material-handling and other equipment.

On account of the pressing need for warehouse and office space by the Procurement Division of the Treasury Department, which has headquarters in the Federal Warehouse, it was necessary to surrender to that organization approximately 18,000 square feet of floor space on the fourth floor of the Federal Warehouse where the major portion of the Section's supply work is carried on. This loss of storage space caused some congestion because the large volume of business demanded larger stocks and consequently greater storage space.

SURPLUS EXPERIMENTAL MATERIALS

During the year a change was made in the means employed in disposing of surplus materials resulting from experimental work at the nearby farms of the Department. The Department Store, operating under the immediate supervision of the Division, went out of existence, its place being taken by a similar vending agency conducted by the Welfare Association of the Department. The surplus experimental materials are now sold through the new organization, prices being fixed as heretofore by the Division of Purchase, Sales, and Traffic, which also supervises the collection of the proceeds and their deposit in the Treasury to the credit of miscellaneous receipts.

COORDINATING BOARDS

With the establishment of the Procurement Division in the Treasury Department under Executive Order No. 6166, the office of Chief Coordinator was abolished, together with many of the activities thereunder, other activities being continued in more or less modified form under the supervision of the Director of Procurement. Under the new arrangement, the Federal Traffic Board, upon which the traffic officer of the Department represented Agriculture, ceased to exist, the rate and routing work previously performed by the Board being provided for within the new procurement organization. The Federal Standard Stock Catalog Board and the Federal Specifications Board, however, are functioning practically as heretofore under the direction of the Director of Procurement; the chief of the Division of Purchase, Sales, and Traffic continues as this Department's representative on those Boards. Under the new set-up in the Procurement Division, there was created an advisory committee of five members, rotating among the several departments annually, to make studies of matters of policy affecting the various functions of the Procurement Division and to prepare the proper regulations and changes in regulations to make effective execution of the duties as determined upon in the Procurement Division, Branch of Supply, including those of the various coordinating agencies under its control. During the fiscal year the Chief of the Division of Purchase, Sales and Traffic has served as a member of this committee. The Department of Agriculture was also represented on the envelop committee of the Post Office Department by an employee of the Division of Purchase, Sales, and Traffic.

DIVISION OF OPERATION

The appropriations and expenditures for the Office of the Secretary during the past 3 fiscal years are shown in table 16.

TABLE 16.—*Appropriations and expenses, 1932, 1933, and 1934*

Item	1932	1933	1934
Appropriations.....	\$1, 449, 102	\$1, 206, 547	¹ \$1, 181, 857
Expenditures.....	1, 362, 412	1, 001, 945	1, 117, 852

¹ Includes \$17,296 provided in the First Deficiency Act, 1934, for rent of buildings in the District of Columbia.

GENERAL ACTIVITIES

The establishment of the Agricultural Adjustment Administration and the transfer to the Department of the Interior responsibility for the administration of the buildings occupied by the Department of Agriculture in Washington, materially influenced the work of this Division. The creation of the Agricultural Adjustment Administration added to the volume of work so that it became necessary to employ additional personnel, while the transfer of functions of building administration to the Department of the Interior changed the character of administration from that of immediate supervision of the Guard Force, Maintenance Section, and Mechanical Shops, to that of coordinating the work as contact agency.

The tremendous demands for space necessary to house the constantly increasing personnel of the Agricultural Adjustment Administration necessitated the occupancy, early in the fiscal year, of the partially completed portions of wings 2 and 3 of the South Building and the utilization of the Library stack room between wings 4 and 5 of that building, as well as space in temporary structures. Organizations of the Department housed in the Administration Building and the South Building were moved to other quarters or required to very greatly reduce space occupancy. Major portions of the Office of Experiment Stations, the Bureau of Biological Survey, and certain units of the Bureau of Plant Industry and the Extension Service were transferred from the South Building to quarters in temporary buildings. These expedients proved unavailing and it was necessary to operate approximately 75 percent of the personnel of the Agricultural Adjustment Administration upon 2- and 3-shift working schedules. Arrangements were finally made near the close of the fiscal year for the assignment to the Agricultural Adjustment Administration of five floors of the old Post Office Building. This arrangement made it possible to transfer approximately 3,500

employees to this area with corresponding relief to the congestion existing in the Administration and South Buildings, and the making possible of the transfer of the organizations housed in temporary buildings and other structures outside the general Department group. This consolidation of activities was materially aided by the completion of wings 6 and 7 of the South Building with the consequent practical doubling of the area available for utilization in that structure. The transfer of the remaining units of the Agricultural Adjustment Administration to space in wing 7 of the South Building and the rearrangement of the other Department organizations was in process at the close of the fiscal year.

The very great increase in the number of employees and the operation of a considerable portion of these on a 2- or 3-shift basis necessitated an increase in the nursing staff from 1 to 5 employees. With the transfer of a considerable group of the personnel of the Agricultural Adjustment Administration to the old Post Office Building it was necessary to establish a subsidiary emergency room in that structure and to assign 3 nurses for the care of the personnel. The number of patients treated has increased from a monthly average of approximately 500 to in excess of 2,000.

SECTION OF MAIL AND FILES AND POST OFFICE

A count of letters and telegrams received in the file room during particular periods indicated an increase of 396 percent in the number of letters and 96 percent in the number of telegrams received as compared with similar periods during the previous fiscal year. A change was made in the operating procedure in connection with the handling of mail addressed to the Secretary of Agriculture. Previously such correspondence has been opened in the immediate Office of the Secretary and referred to the proper bureau or official for the preparation of the necessary reply. Under the new plan this work as well as the visaing of correspondence prepared for the Secretary's signature is performed in the file room. In addition responsibility has been assigned for the safeguarding and filing of all documents approved by the Secretary of Agriculture incident to the operation and enforcement of the Agricultural Adjustment Act.

A count of the mail received in the Department post office indicated an increase of 46 percent over a similar period during previous fiscal years. The working schedule for the operation of the mail trucks has been assigned so as to provide hourly service to and from the city post office. Plans have been developed for the operation of the pneumatic-tube system serving the Administration Building and the South Building.

MOTOR-TRANSPORT SERVICE

The motor-truck pool comprises a fleet of 24 vehicles used for the performance of necessary general departmental work and available for use by the various bureaus and offices of the Department upon call. General departmental service is performed at the expense of the Office of the Secretary but bureau work is subject to reimbursement from the respective appropriations.

TELEGRAPH AND TELEPHONE SECTION

The great increase in the volume of telephone business occasioned an increase in personnel from 4 to 7. The number of telephones in use during the fiscal years 1929, 1930, 1931, 1932, 1933, and 1934, is indicated in table 17.

TABLE 17.—*Number of telephones in use and telegraph messages handled, 1929 to 1934, inclusive*

Year	Telephones			Telegraph messages, incoming and outgoing
	Main stations	Extension stations	Total	
1929.....	700	762	1,462	49,913
1930.....	721	789	1,510	50,430
1931.....	807	905	1,712	61,035
1932.....	918	941	1,859	62,462
1933.....	979	938	1,917	60,257
1934.....	1,424	1,258	2,682	166,158

Based on actual count and traffic tests made during the year table 18 represents an estimate of the number of telephone calls made, in comparison with other fiscal years.

TABLE 18.—*Distribution of telephones calls made in the Department of Agriculture, 1932, 1933, and 1934*

Type of call	Estimated number of calls made		
	1932	1933	1934
Branch-to-branch.....	1, 528, 675	(¹)	(¹)
Outgoing trunks.....	199, 979	254, 245	374, 866
Outgoing Government trunks.....	57, 619	62, 635	126, 181
Incoming trunks.....	463, 386	² 552, 360	² 811, 881
Incoming Government trunks.....	105, 507	97, 800	² 203, 490
Outgoing tie lines.....	193, 402	(¹)	(¹)
Incoming tie lines.....	149, 494	² 210, 200	² 311, 150
Outgoing long distance and toll.....		² 12, 123	² 20, 700
Incoming long distance and toll.....		² 10, 250	² 18, 176

¹ Since the introduction of the automatic system no tally can be made of such calls.

² These calls handled by operators.

There were audited 193,412 telegrams for which 253 combined vouchers were prepared amounting to \$117,112.60. For the previous fiscal year the number of telegrams was 150,532, with 248 combined vouchers representing expenditures of \$80,589.16.

There were 305 telephone rental vouchers audited and passed to the various bureaus and offices for payment aggregating \$53,605.15, and 47 long-distance telephone toll bills involving an expenditure of \$50,084.65. This compares with a total cost for long-distance telephone tolls during the previous fiscal year of \$10,659.05.

REAL ESTATE AND HOUSING

The continued development of the Federal building program has made it possible for the Department to occupy space in a number of new Federal buildings throughout the country. Tentative plans and drawings for a considerable number of additional structures have been approved. In addition the Public Works Administration has approved projects involving the erection of several hundred buildings in various locations throughout the country. Despite the increase in the space occupied in Federal buildings there has been only a minor reduction in the amount of space leased, although there has been a marked reduction in the total rentals paid.

The outstanding changes in the housing situation in the District of Columbia were the completion and occupancy of portions of wings 1, 2, and 3 of the South Building, the completion and partial occupancy of wings 6 and 7 of the same building, and the assignment to the Department for the use of the Agricultural Adjustment Administration of five floors of the old Post Office Building. The additional space involved will make it possible for the Department to materially relieve the congestion existing in the South and Administration Buildings, to abandon all of the space occupied in Temporary Building C which is scheduled for demolition, to abandon the numerous small buildings in the neighborhood of Eighth and B Streets SW. which have been utilized, and, with the exception of portions of the Bureau of Animal Industry and the Extension Service, to move all units previously housed in Temporary Building F. Unfortunately the amount of space available will not permit the making of any provision for the Forest Service, the Bureau of Public Roads, and the fertilizer investigation unit of the Bureau of Chemistry and Soils which are located in rented buildings.

Table 19 shows the space occupied by the various bureaus and offices of the Department at the close of the fiscal year and the total rentals paid.

TABLE 19.—*Space occupied by Department of Agriculture and cost of rentals, 1934*

Bureau or organization	Federal buildings		Rented buildings			
	In District of Columbia	Outside District of Columbia	In District of Columbia		Outside District of Columbia	
			Area	Rental	Area	Rental
	<i>Square feet</i>	<i>Square feet</i> ¹	<i>Square feet</i>	<i>Dollars</i>	<i>Square feet</i>	<i>Dollars</i>
Agricultural Adjustment Administration.....	251,813	5,924			19,972	21,980
Agricultural Economics.....	182,147	118,613			120,135	65,331
Agricultural Engineering.....	20,062	7,449			12,692	2,016
Animal Industry.....	89,953	69,582			28,788	30,625
Biological Survey.....	19,853	17,064			26,102	7,757
Chemistry and soils.....	68,224	3,027	69,744	14,000	14,547	3,612
Dairy Industry.....	32,160				200	96
Entomology.....	51,397	13,188			149,526	45,349
Experiment Stations.....	12,694	480				
Extension Service.....	38,920	114,679				
Food and Drug Administration.....	39,739	63,049			5,151	4,810
Forest Service.....		164,370	55,629	46,841	656,772	156,235
Grain Futures Administration.....	2,700	1,217			6,600	8,900
Home Economics.....	21,611					
Office of Information.....	37,448					
Library.....	34,139					
Plant Industry.....	231,519	6,677			49,051	20,427
Plant Quarantine.....	22,981	23,953			117,244	26,818
Public Roads.....	7,676	44,894	28,482	15,000	72,040	50,252
Secretary.....	139,300	2,596			2,630	2,226
Weather Bureau.....	36,543	137,710	2,180	1,000	62,507	76,159
Total.....	1,340,879	794,472	156,035	76,841	1,343,957	522,593

¹ Exclusive of buildings owned by Department of Agriculture.

A summary of total space occupied by the Department of Agriculture and cost of rentals for the years 1931, 1932, 1933, and 1934 is shown in table 20.

 TABLE 20.—*Space occupied by Department of Agriculture and cost of rentals, 1931 to 1934, inclusive*

Year	Federal buildings		Rented buildings			
	In District of Columbia	Outside District of Columbia	In District of Columbia		Outside District of Columbia	
			Area	Rental	Area	Rental
	<i>Square feet</i>	<i>Square feet</i>	<i>Square feet</i>	<i>Dollars</i>	<i>Square feet</i>	<i>Dollars</i>
1931.....	1,027,686	429,140	326,629	133,945	1,317,114	745,692
1932.....	1,331,041	601,727	217,817	72,051	1,245,338	694,393
1933.....	1,438,278	773,653	204,929	69,296	1,382,421	589,531
1934.....	1,596,798	794,472	192,779	76,841	1,343,957	522,593

REPORT OF THE CHIEF OF THE BUREAU OF PLANT INDUSTRY, 1934

UNITED STATES DEPARTMENT OF AGRICULTURE,
BUREAU OF PLANT INDUSTRY,
Washington, D. C., September 12, 1934.

SIR: I submit herewith a report of the work of the Bureau of Plant Industry for the fiscal year ended June 30, 1934.

Respectfully,

KNOWLES A. RYERSON, *Chief.*

HON. HENRY A. WALLACE,
Secretary of Agriculture.

PLANT RESEARCH AND AGRICULTURAL ADJUSTMENT

As in the past, the Bureau has centered its activities on scientific research in the belief that such procedure will lead to the greatest aid to social and economic progress, thus contributing definitely and specifically to a sound program of agricultural adjustment. The researches of the Bureau aim at bringing about greater efficiency in crop production, transportation, and storage, together with the most advantageous methods of utilization. Thus the Bureau's fundamental work affects directly the producer, also those who legitimately and necessarily act as intermediaries between producer and consumer, and the consumer proper. The projects now mainly engaging the attention of the scientific staff extend over a wide and varied field. They involve three broad groups: (1) genetics or plant breeding, whereby crops better adapted to climatic vicissitudes and the constant shifting and changes in economic requirements are brought into being; (2) research on phytopathologic or plant-disease and plant-pest control; and (3) agrotechnic or improved cultural and handling methods whereby unit costs of production are lessened and unit prices received by the producer are increased.

CHANGES IN ORGANIZATION AND PERSONNEL

Some noteworthy changes in organization and personnel of the Bureau were made during the fiscal year. On December 31, 1933, William A. Taylor, Chief of the Bureau, retired following a Presidential extension of 6 months and after more than 42 years in the service of the Department. Dr. Taylor served as Chief of the Bureau for 20 years. On December 1, 1933, the plant-disease eradication and control activities of the Bureau, carried by the divisions or projects of barberry eradication, blister rust control, citrus canker eradication, Dutch elm disease control, and phony peach eradication, were transferred to the Bureau of Entomology and organized as a Division of Plant Disease Eradication and Control. Karl F. Kellerman, Assistant and Associate Chief of the Bureau since 1913, was placed in charge of this new division. The funds and most of the personnel of these several units were transferred to the other Bureau.

The following additional changes were made in the personnel of the Bureau, effective January 1, 1934:

Knowles A. Ryerson, for 6 years Chief of the Division of Foreign Plant Introduction in the Bureau of Plant Industry, was made Chief of the Bureau. Frederick D. Richey, for 23 years a member of the staff of the Division of Cereal Crops and Diseases, was made Associate Chief of the Bureau.

On February 9, 1934, the following administrative changes became effective:

A Division of Plant Exploration and Introduction was established, with B. Y. Morrison, principal horticulturist, in charge. In this Division were merged the former Division of Foreign Plant Introduction, including the project on erosion plant nurseries; the project on rubber and other tropical plants, and the former Division of Botany. The new Division will also administer the National Arboretum, with Frederick V. Coville continuing as acting director. O. F. Cook and Dr. Coville were assigned to the new Division of Plant Exploration and Introduction, in charge respectively of the rubber investigations project and the botany project.

A Division of Cotton and Other Fiber Crops and Diseases was established, with M. A. McCall, principal agronomist, in charge. In this Division were merged the project on breeding and cultural improvement of cotton, including cotton diseases, of the former Division of Cotton, Rubber, and Other Tropical Plants, and the former Divisions of Egyptian Cotton Breeding and Fiber Plant Investigations. T. H. Kearney and Lyster H. Dewey were assigned to the new Division of Cotton and Other Fiber Crops and Diseases, in charge respectively of the Egyptian cotton-breeding project and the fiber-plant-investigations project. Dr. McCall, in addition to his other duties, continues as principal agronomist in charge of the Division of Cereal Crops and Diseases.

WORK UNDER P. W. A. AND C. W. A. ALLOTMENTS

The Public Works Administration allotted a total of \$4,982,057 to the Bureau during the year. Of this amount \$2,880,000 was for control and eradication of the Dutch elm disease, black stem rust of wheat, and white pine blister rust, the administration of which was transferred to the Bureau of Entomology on December 1, 1933. The net amount available to the Bureau for its activities was therefore \$2,102,057. Of this amount \$630,000 was allotted to establish plant reserve stations in collaboration with the soil erosion control activities of other agencies of the Department of Agriculture and of the Department of Interior. An allotment of \$40,000 was made for agronomic studies of crops furnishing nonpoisonous spray materials. The balance, \$1,133,733, was allotted for the improvement of the physical plant of the Bureau throughout the field. The expenditure of these funds is resulting in greatly improved facilities for the research activities of the Bureau.

The Civil Works Administration approved one project for the Bureau, on which approximately \$500,000 was expended. The major portion was devoted to physical improvements in the field, including repairs, painting, improving drainage and irrigation systems, improving and constructing roadways, grading, and minor construction. While the work was done under difficulties, it resulted in very helpful improvements in the physical plant. This project also included a bibliographical research unit and a translators' unit, whose work was very satisfactory and helpful to the Bureau's research activities.

THE YEAR'S WORK IN BRIEF

The following pages present a condensed account of the year's activities as carried on through the various divisions. Because of space limitations it is confined to definite results attained in investigations and to progress made in the more important projects.

DIVISION OF CEREAL CROPS AND DISEASES

M. A. MCCALL, *in Charge*

CORN

Breeding and introducing superior hybrids.—Corn double crosses produced in cooperative breeding programs are now available for distribution in Iowa, Missouri, Ohio, Indiana, Illinois, and Wisconsin. The single-cross parents of selected double crosses and certain selected inbred lines have been made available for the commercial production of double-crossed seed in Iowa, Missouri, and Illinois. In Iowa two double crosses, developed cooperatively and distributed by the Iowa Agricultural Experiment Station, were commercially produced in sufficient quantity to plant 7,000 to 8,000 acres in 1934, and it is expected that seed produced this year will be sufficient to plant

175,000 acres next season. As a 4-year average these hybrids have given increased yields about 20 percent above the yields of open-pollinated entries in the Iowa yield test in the sections for which they are recommended. They have also been shown to be much more resistant to lodging.

New varieties.—Yellow Pride of Saline, a new variety of corn developed in cooperation with the Kansas station, was the highest yielding yellow variety in 1933 in portions of Kansas and is being distributed for commercial production. Yellow varieties with good husk protection are being produced to supplant the present white varieties in Louisiana and Georgia.

Breeding for wilt resistance.—Golden Cross Bantam, a hybrid sweet corn developed in cooperation with the Indiana station, has continued to be the most resistant to bacterial wilt of any of the early yellow strains of sweet corn now in commercial production. In yield trials it has so uniformly proved its value that it now ranks as a recognized variety and is offered commercially by many seedsmen. Breeding work for wilt resistance is being continued, and satisfactory progress is being made in the production of inbred lines resistant to bacterial wilt under conditions where Golden Cross Bantam shows some susceptibility. In tests in Indiana, Sunburst pop corn, developed in cooperation with the Kansas station, has proved to be more resistant to bacterial wilt than any other pop-corn variety tested.

Extent and cause of damaged kernels.—A survey in cooperation with the Illinois and Wisconsin stations and the Bureau of Agricultural Economics indicates that approximately 33 percent of the market receipts of the average corn crop is lowered in grade because of damaged kernels. Preliminary data indicate that a fungus, *Diplodia*, is the predominant organism associated with damaged kernels in samples from Illinois, Ohio, and parts of Iowa and Missouri. *Fusarium moniliforme*, another fungus, was predominant in samples from Kansas, Nebraska, and parts of Missouri, and *Basisporium gallarum* in those from northern Iowa. The season of 1933 was exceptionally favorable for diplodia ear rot.

WHEAT

New disease-resistant and high-yielding varieties.—Several new varieties of wheat, developed in cooperative experiments for resistance to disease, superior quality, and high yield, have been made available to farmers. Thatcher, a hard red spring wheat produced at the Minnesota station, was released in the spring of 1934. It is highly resistant to stem rust, has excellent milling and baking qualities, and seems well adapted for heavy soils in the spring-wheat area of Minnesota. Three varieties resistant to forms of bunt prevalent in the regions to which they are adapted give promise of great value in reducing losses from that disease in the Pacific Northwest and the Intermountain States. These are Relief, a hard red winter wheat (Hussar×Turkey selection) from the Utah station, distributed in a limited way in the fall of 1933; Oro, a hard red winter variety developed in Oregon; and Albit, a white club wheat produced at the Washington station. Oro and Albit were introduced a few years ago and are being grown to an increasing extent as further trials prove their merits. Cheyenne, a selection from Crimean hard winter wheat made by the Nebraska station, distributed in a small way in 1930 and more extensively in the fall of 1933, is showing desirable qualities as a "combine" wheat. Tenmarq, a hard red winter wheat from the Kansas station, released to farmers in 1932 and grown on several thousand acres in 1934, is resistant to stem rust and in tests over a number of years has averaged about 15 percent above Turkey in yield. Kawvale, a semihard red winter variety, developed cooperatively at the Kansas station and released in the fall of 1933, is early, winter-hardy, resistant to leaf rust and Hessian fly, and produces high yields, but shatters easily and therefore is not suited to combine harvesting.

Disease investigations.—Marked progress has been made in finding varieties of wheat resistant to flag smut, a serious disease in Australia and discovered in the United States a few years ago. Of 252 varieties grown in infested soil at Leavenworth, Kans., more than a third have been found to be resistant. With this information the elimination of the disease from the wheat fields of this country is believed to be possible.

The organism causing the Columbia River Basin foot rot, which seriously threatened the wheat crop of a large section of the Pacific Northwest a few years ago, has been identified as *Cercospora herpotrichoides*, and enough has been learned regarding its habits to enable farmers to control it effectively.

BARLEY

The repeal of the prohibition amendment has emphasized the importance of producing high-quality barley for the malting trade. There are many suitable varieties so far as quality alone is concerned, but all the older, well-known sorts are susceptible to barley scab, a disease which seriously reduces the yield in the Mississippi Valley and renders the affected crop entirely unsuitable for malting. As a result of investigations with many varieties, a number have been found that appear to be quite resistant to scab. Two-rowed varieties as a group are more resistant than the six-rowed varieties, but they are not considered satisfactory for brewing in this country. Important differences in the six-rowed group have been discovered, the most promising variety being a hybrid. Extensive work is under way to produce new smooth-awned barleys which are satisfactory with respect to yield and also for malting.

OATS

Lenroc, a new hybrid oat developed in cooperative experiments with the New York (Cornell) station from a Great American×Cornellian cross, is being increased for distribution to farmers in New York State. This new variety, which is high-yielding and early, was produced primarily for those who object to the gray kernels of Cornellian. It has exceeded the Cornellian parent in yield over a 10-year period by 2 bushels per acre. Hybrid oat strains from a Victoria×Richland cross show resistance to stem rust, crown rust, and smut, the three most serious oat diseases. This is the first reported instance where important resistance to these diseases has been combined in one strain.

GRAIN SORGHUMS

Improvement and introduction of varieties.—Beaver and Wheatland, new hybrid varieties of milo produced at the Southern Great Plains Field Station, Woodward, Okla., and distributed a few years ago, were grown on several hundred thousand acres in 1933 and continue to show good yields and quality. They are especially suited for combine harvesting. Atlas sorgho, a dual-purpose forage and grain sorghum, produced cooperatively at the Kansas station, has shown superior yields in dry seasons and is finding favor with growers. Greeley, Sooner, and Kalo, productive early-maturing grain sorghums for northern and high altitudes, also developed cooperatively, have given promising results.

Control of milo disease.—Experiments have demonstrated that a soil-borne disease of milo which was discovered in Kansas a few years ago and has since appeared in Texas and New Mexico can be effectively controlled by growing a resistant strain of Dwarf milo produced cooperatively in Kansas. This strain survived vigorously in 1934 under conditions of infection and drought when others succumbed.

RICE

Superior new varieties.—About 28,000 acres of the Fortuna and Rexoro varieties of rice, produced in cooperation with the Louisiana station, were grown in the southern rice area in 1933. Because of superior quality, rice of these varieties brought a premium of 30 to 75 cents a barrel over leading standard varieties. About 97 percent of the California rice acreage in 1933 was sown to Caloro (midseason) and Colusa (early maturing), varieties developed and distributed in cooperation with the California station.

Improvement of milling technic.—In parboiling experiments in which rough rice of the Fortuna and Rexoro varieties was used, it was found that by proper treatment the yield of head rice in milling can be increased about 25 percent as compared with the untreated rice of the same varieties. The parboiled rice retains its shape better than untreated rice in cooking and after sterilization in canning.

SEED FLAX

A number of rust-immune flax hybrids developed cooperatively at the Minnesota station are showing promise. Studies show that a period of drought or of abnormally high temperature during the 30 or 40 days beginning at early bloom results in a lower acre yield and lower oil content of the seed and lower drying quality (iodine number) of oil. The highest yields and highest

oil content and quality are produced when the crop is grown under conditions of favorable rainfall, or under irrigation, in a cool climate. The oil content and quality of new strains are receiving particular attention.

SELENIUM TOXICITY

In studies of the so-called "alkali disease" of livestock, which occurs in certain areas of the northern Great Plains, it has been shown that selenium compounds absorbed by plants from the soil are probably responsible. The observable symptoms of selenium injury to wheat are determined not by the absolute amount of selenium present in the soil or culture medium but by the relative amount with reference to sulphur. In solution cultures injury occurs whenever the selenium-sulphur ratio is 1:8 or more, but has never occurred where the ratio is 1:12 or less. The toxicity to animals of plants grown on soil containing selenium has been proved, and the effect of sulphur on toxicity is being investigated in cooperation with other bureaus.

VERNALIZATION (IAROVIZATION)

Extensive field data comparing the yields of spring wheat with those of winter wheat seeded late in the fall, but under such conditions that germination took place in time to assure satisfaction of the low temperature requirements, as well as controlled experiments with wheat and corn, confirm the belief, based on other considerations, that the practical advantages of treatment known as iarovization or vernalization have been overemphasized so far as the United States is concerned. Not only does it appear that no particular advantage in yield can be expected in most cases, but also that the method is so complicated as to require more than average skill and equipment to avoid failure.

RUST GENETICS

Interesting and potentially important results have been obtained in studies in hybridizing rusts of various small grains and grasses. A form of stem rust of wheat crossed with a variety of rust found on certain grasses produced a previously unknown form of stem rust of wheat. The grass rust crossed with rye rust produced another form of the latter and two forms of wheat rust. Another form of rye rust crossed with the grass rust produced three different kinds of rust, one being a common form on oats.

DIVISION OF COTTON AND OTHER FIBER CROPS AND DISEASES

M. A. MCCALL, *in Charge*

COTTON

Improved varieties.—Acala cotton, introduced by the Bureau some years ago, is now grown on approximately half a million acres in the irrigated valleys of the Southwest, to the almost complete exclusion of other varieties except the Pima Egyptian grown in the Salt River Valley. Special strains are being selected and tested under different conditions in different sections of the Cotton Belt. Lone Star, with somewhat shorter fiber than Acala but with slightly larger bolls, continues to give excellent results, especially in Texas, where it is one of the leading varieties. New and promising varieties from tropical America are being bred and tested, including Tuxtla and Durango from Mexico and Kekchi from Guatemala. A special selection from Acala called Tidewater, with 1¼-inch staple, has shown excellent results for several seasons in field plantings near Charleston, S. C., outyielding several popular commercial varieties, and has also shown marked indications of resistance to wilt.

The new S×P 30 (Sakellaridis×Pima) Egyptian variety gave further evidence of superior productiveness, surpassing Pima in yield of lint by 22 to 32 percent in three tests in Arizona and California. It was grown commercially on 200 acres in 1933 and 600 acres in 1934. Preliminary spinning tests by manufacturers of sewing thread indicate that it may prove an acceptable substitute for the imported Sakel cotton.

One-variety communities.—The present emergency measures for control of cotton production afford an excellent opportunity for adjustment on a basis of quality as well as quantity. The development of one-variety communities, where pure seed of superior varieties can be produced and maintained and

regular supplies of quality fiber can be assured, is now recognized as a simple and practical way to accomplish this end. With the experience gained in the irrigated districts of the Southwestern States, about 100 communities have been organized during the last 3 years in the main Cotton Belt States under the cooperative guidance of Federal and State institutions and local agricultural leaders. In 1933 a total of approximately 300,000 acres of community cotton was grown in the main Cotton Belt in addition to about 500,000 acres in the irrigated valleys. The work with one-variety communities is being extended to include investigations of the quality of the fiber of the varieties grown, in order to obtain fuller information on the spinning quality of the varieties chosen for community planting and also as a basis for the elimination of varieties showing definitely inferior fiber.

Diseases and disorders.—Special attention has been given to cotton root rot, the most destructive of the cotton diseases. The studies have included both laboratory and field experiments, and though no effective remedy has yet been found, new information is being obtained on various aspects of the problem which gives promise that control measures may eventually be developed.

A practical method for preventing the occurrence of crazy top, a disorder responsible for heavy losses in cotton production in Arizona, was demonstrated in 1933. On calcareous soils it was found that irrigations applied with sufficient frequency to prevent checking of growth prevented the trouble.

A study of cotton fiber quality, especially the effects of so-called "stress" conditions resulting from high temperatures and uneven distribution of irrigation water in impervious soil, was made in Arizona, and the results were reported in Technical Bulletin 392.

FIBER FLAX

Breeding and agronomic work with fiber flax was continued at the field station at Corvallis, Oreg., where more than 300 different selections, strains, or varieties were grown for comparison. In a test in a farmer's field, Stormont Cirrus, a variety from northern Ireland, yielded about 25 percent more than J. W. S., the leading variety grown in Oregon in recent years.

Selections were tested for disease resistance, especially to flax rust and flax wilt, at Astoria, Oreg.

Samples of scutched fiber from 160 varieties were subjected to hackling tests in a linen mill at Salem, Oreg. The yields of dressed or hackled fiber ranged from about 77 to 87 percent of the original weight of scutched fiber, whereas most of the imported Russian flax yields less than 60 percent.

In further tests on different soil types, the Chehalis series produced the best results, as in the preceding year. Well-drained and fertile soils of the Willamette and Amity series gave good results, and poorly drained soils of the Wapato and Dayton series produced poor flax. Nitrogenous fertilizers increased the yield and apparently did not injure the quality or the tensile strength of the fiber.

Strong claims having been made that retting flax by means of sea-kelp soap was much superior to any process now in use, a careful test was made at the experimental flax mill. This test demonstrated very definitely not only that soap retting is much more expensive than warm-water retting but that it is practically impossible to produce a satisfactory fiber from soap-retted flax straw.

Fiber flax grown at the New Jersey and New York (Cornell) Stations, while equal in quality to much of that imported, was inferior in both yield and quality to that produced in Oregon.

The Bureau has endeavored to counteract the misleading statements of promoters with various schemes for obtaining funds from farmers or from the Government to develop a fiber flax industry by methods not yet demonstrated.

DIVISION OF DRUG AND RELATED PLANTS

W. W. STOCKBERGER, *in Charge*

The revival of hop growing following the repeal of prohibition has called for increased attention to this crop, and the Division has also endeavored to meet the unusual demands from individuals and from some of the new Government organizations for information and advice regarding plants yielding drugs,

essential oils, perfumes, and related products, in the general search for new crops having commercial possibilities. The policy has been not to encourage the growing of these special crops except where they are reasonably promising.

HOPS

A promising beginning has been made on a project to determine factors affecting the quality of hops, with a view to improving the quality of American hops as a means of meeting the competition of the foreign-grown hops that are now imported in considerable quantities. By analyses of many samples obtained under controlled conditions with respect to harvesting, drying, and baling it is believed that improved practices may be formulated that will result in better quality and increased prices. Hops are grown mainly in the Pacific Coast States and in New York.

Downy mildew, a disease which is a constant threat to the hop-growing industry in Oregon and Washington, has been a subject of continued study in cooperation with the Oregon station. Two methods are being followed, namely, field practices to control the disease, and the development of resistant varieties.

Field practices found to be reasonably effective are (1) clean culture and the removal of old vines from the field in the fall; (2) application of fungicide dusts to the crowns; (3) removal of the infected growth (spikes) from the crowns in the spring; and (4) spraying vines with bordeaux mixture. The hop-breeding experiments are designed to develop a high-quality, high-yielding variety resistant to downy mildew. Thousands of hybrid seedlings, selections, and introductions have been grown, and several promising sorts are being further tested to prove their commercial value before making them available to growers.

INSECTICIDAL PLANTS

In the search for insecticides harmless to human health, to replace poisonous chemicals such as arsenic and lead and thereby remove any possible danger from spray residues on fruits and vegetables, the Bureau is studying plants containing insecticidal substances. Through the Division of Plant Exploration and Introduction, derris and cube plants have been obtained from the Tropics and other plants with insecticidal properties are being sought.

The Division of Drug and Related Plants is making a survey and study of the native plant known as devil's shoestring (*Cracca virginiana*), the root of which in some localities contains rotenone and probably other toxic substances, with the objects of determining in what regions the plant is toxic and what conditions of soil or climate cause the toxicity, and working out cultural methods for high content of insecticidal substances.

Studies and tests of pyrethrum have been continued. This plant is being grown experimentally in a number of places, and efforts are being made to develop a more toxic type by selection. Business interests have introduced it as a commercial crop in Pennsylvania, and it seems adapted to the other sections. Experiments were carried on at the Arlington Experiment Farm (near Washington, D. C.), to test the feasibility of using mechanical means for harvesting and threshing the crop.

Experiments are also being conducted by the Division of Tobacco and Plant Nutrition in developing types of tobacco of high nicotine content for insecticidal purposes.

OIL, DRUG, AND PERFUMERY PLANTS

Safflower.—The possibilities of growing safflower in the northern Great Plains as a source of drying oil to augment the insufficient supply of linseed oil are being tested in a practical way. Three acres of the crop were grown at the Bureau's stations at Huntley, Mont., and Newell, S. Dak., to maintain a seed supply of special varieties of Russian safflower high in oil content. Safflower has proved to be more resistant to drought than some of the crops generally grown in that region.

Japanese mint.—A report on the completed investigation of the possibilities of growing Japanese mint in the United States as a source of natural menthol was made available during the year by the publication of Technical Bulletin 378.

Perfumery plants.—Experiments in growing lavender for the production of lavender oil, of which several hundred thousand pounds are imported annually, have given encouraging results in the Puget Sound area. Oil from experi-

mental plantings is of acceptable quality. Yields, production costs, and methods of harvesting with machinery to reduce labor costs are being studied.

Attar of rose has been the subject of numerous inquiries. Incomplete experiments in cooperation with the Oregon station, discontinued for lack of funds, indicate that the yield of perfume from the variety of rose tested (Ulrich Brunner) is lower than in France, the quality is only fair, and the cost of production is too high. It is possible that more favorable results could be obtained in other regions having a different climate and lower labor costs.

DIVISION OF DRY LAND AGRICULTURE

C. E. LEIGHTY, *in Charge*

The investigations in dry-land agriculture, conducted at 19 field stations in the semiarid region in cooperation with State experiment stations, are directed to basic problems of that region, and the results are of local, regional, and even world-wide application. About 5,000 plots are used in crop rotation and cultivation experiments with about 25 crops. Studies are made to determine the best methods of conserving and utilizing the limited rainfall, what crops and varieties to grow, how best to manage pastures, where it is safe to farm and where not, and other problems of dry-land farming. The large body of data assembled is useful not only to farmers but to officials engaged in classifying land, and will certainly be of further use if land purchases are undertaken in this region or if any general changes in the use of the land are made. Two projects—shelter belts and pasture management—are of timely interest in the national program of agricultural readjustment.

SHELTER BELTS

High winds are the rule in the entire Great Plains area, and farm homes, gardens, and orchards require protection. To provide this protection, the stations at Mandan, N.Dak., Cheyenne, Wyo., and Woodward, Okla., have undertaken wide demonstrations of shelter-belt plantings. Some of the hardy trees such as green ash, boxelder, Chinese elm, Siberian pea-tree (caragana), Russian-olive, northwest poplar, and evergreens have been furnished to cooperating farmers who plant and tend them under station supervision. About 3,000 farmers are cooperating with the stations in growing these shelter belts, and more than 5 million trees have been put out. Many of these cooperators have planted fruit and vegetable gardens in connection with their shelter belts. The effect of the shelter belt on the garden has been pronounced, especially when contrasted with gardens grown in the open. In dry years the majority of the dry-land gardens that survive are those protected by shelter belts.

The season of 1933 offered many opportunities both at the stations and on farms for comparison of the drought-resisting abilities of the different conifer species that are generally recommended for the northern Great Plains. Western yellow or ponderosa pine is outstanding in its ability to thrive under adverse moisture conditions. Scotch pine, which in the past has generally been considered absolutely hardy, suffered both killing back of leader growth and losses in stand. White spruce and Black Hills and Colorado blue spruces were rapidly turning brown and dying as a result of the drought. The losses in spruce are confined chiefly to trees in southern and western border rows of shelter belts. A hardness rating on evergreens at the present time would undoubtedly place western yellow pine at the head of the list, followed by red cedar, the three spruces, Scotch pine, Norway pine, and jack pine.

PASTURES

It has been found at the Mandan, N. Dak., station that although a rather large number of species of plants grow on the prairies of the northern Plains, only 25 or 30 of them are important to grazing, and 4 of these produce about half the forage. By experiments in cooperation with the North Dakota station it has been shown that 7 acres under a system of continuous grazing will support a steer for 5 months and produce a gain of 300 pounds. By following a system of deferred and rotation grazing the area can be reduced to 5 acres with a gain of 275 pounds and the pastures will be maintained in better condition in respect to the desirable species. It has been found, too, that with

a combination of cultivated and native pastures stock make better seasonal gains per acre than on either native or cultivated pasture alone, and less land is required than for native pasture.

DIVISION OF FORAGE CROPS AND DISEASES

A. J. PIETERS, *in Charge*

PERMANENT PASTURES

Pastures for land taken out of cultivation.—Probably the best use to which land taken out of production of cash crops can be put is laying it down to permanent pastures. A field in permanent grass will produce fewer feed units than one in grain, but will produce these at a lower cost. An increase in pastures, therefore, will not tend to increase livestock production, but the contrary, and at the same time the soil will be protected against erosion, the fertility will be slowly built up, and the farmer will be laying the foundation for better crops later. The importance of pastures in the program of agricultural readjustment is realized, and experimental work is proceeding as rapidly as possible to determine the best methods of utilizing and of fertilizing them, as well as the best grasses or legumes to use in different regions. As an initial step in furtherance of the "back-to-grass" program, a pasture handbook (Miscellaneous Publication 194) was prepared and issued in collaboration with the Bureau of Animal Industry and the Bureau of Dairy Industry.

Grazing bluegrass.—The results of the work of the season of 1933 confirmed the conclusion, earlier arrived at, that on good bluegrass rotation grazing has no advantage over continuous grazing. However, where the grass needs resting in summer the transfer of cattle to a field of lespedeza where this will thrive is desirable. At Beltsville, Md., on good pasture young steers gained 250 to 300 pounds in a 5-month grazing season with no supplemental feed.

Value of fertilizer for pastures.—The value of commercial fertilizer for the renovation of poor pastures was strikingly shown in investigations in West Virginia, where increases up to 630 percent were secured as a result of fertilizing. This increase was associated with a change in flora from poor native grasses and weeds to the better type of pasture grasses and legumes.

In pasture experiments in Pennsylvania the effect of fertilizers was shown in a radical change in plant population. On the unfertilized pastures the grasses have been gradually giving way to ragweed, wild carrot, and ox-eye daisy. The percentage of bare ground is becoming greater each year, showing what happens when pastures are neglected. On the pastures receiving phosphate alone there has been a rapid increase of clover, resulting in high-yielding pastures, especially in the fall. With the addition of nitrogen to the fertilizer there is an increase in grass, which tends to suppress weeds as well as clover.

The profit from fertilizing varies widely. In some cases it results in a loss. Studies of this sort need to be done under widely varying conditions of both soil and flora before any statement can be made save that judicious fertilizing will pay and that on run-down pastures it must be the first step in improvement.

SOYBEANS

The production of soybeans for use in industry may enable American farmers to use many acres formerly devoted to food and feed crops. Soybean oil has become an important product in many industries and is used in the manufacture of paints, enamels, varnishes, rubber substitutes, linoleum, disinfectants, printer's ink, soap, glycerin, and waterproof goods. About 90 percent of the soybean varieties now generally grown in the United States are derived from the introductions and breeding work of the Department. Among more recent introductions from the Orient, the Mukden and Kungchuling are especially promising as high-yielding grain varieties suitable to the Midwestern and Northern States. Cooperative adaptation tests were conducted in 1933 with about 1,000 recent oriental introductions in 75 localities in 42 States. Seed of the most promising of these new sorts is being increased for more extensive tests on a field basis.

KOREAN LESPEDEZA

The value of Korean lespedeza was shown in cooperative grazing experiments in northwestern Missouri, where it was found that the best management was

to graze the bluegrass pastures to full capacity in the spring and to transfer the cattle during the summer to a field of Korean lespedeza. Two new varieties have been selected and are under test.

BACTERIAL WILT OF ALFALFA

Work has progressed on a study of the nature of immunity to bacterial wilt of alfalfa as well as on the fundamental problem of breeding for disease resistance. A knowledge of these matters is important if an alfalfa is to be produced combining winter hardiness, resistance to bacterial wilt, and high yielding capacity. While the ultimate solution of such a problem may require years, it is encouraging to note that selfed lines in the third and fifth generations from resistant selections contain a higher percentage of resistant plants than did those of the first and second generations inbred. Evidently the quality of resistance can be fixed, and once a line pure for this character is produced it will be only a question of time till the other desirable qualities can be combined with it.

RED CLOVER

An increase in the acreage devoted to forage crops will certainly require more and better red clover. Studies carried on for the last few years have shown that it is possible to produce a hardier and more productive strain than is now commonly used. Work on this problem is progressing, and some selections have been made of promising lots of domestic origin.

DIVISION OF FOREST PATHOLOGY

HAVEN METCALF, *in Charge*

DUTCH ELM DISEASE

Up to the end of the fiscal year the infection of elm trees around New York City with the Dutch elm disease involved some 1,500 square miles in New Jersey and New York States, an area roughly delimited by a circle with a radius of 30 miles with the lower end of Manhattan Island as its center. In this area 1,480 diseased trees had been found, of which 1,254 were in New Jersey, 224 in New York, and 2 in Connecticut, besides which 1 was found in Baltimore, Md. Convincing evidence has been obtained that the fungus causing the disease was brought to the United States in elm burl logs imported at the ports of New York, Baltimore, Norfolk, and New Orleans and used for cutting fancy veneer. The fungus has been cultured from the outer and inner parts of elm bark beetles, which feed on healthy elms. The disease can spread both up and down a limb and can infect a whole tree from a single inoculation.

On December 1, 1933, the control program as distinct from research on this disease became a responsibility of the Bureau of Entomology.

WHITE PINE BLISTER RUST

Climatic conditions in the Pacific Northwest in 1933 appeared to be especially favorable for southward spread of white pine blister rust. Infection on ribes plants (the alternate host) was found for the first time in extreme eastern Oregon at 3 localities, 1 being about 150 miles farther south than the rust had been found at this longitude before. On the eastern slope of the Cascade Mountains in Oregon the rust was found on ribes 50 miles farther south than previously recorded. West of the Cascades infection was discovered on western white pine about 70 miles farther south than previously noted. This infection center is within 110 miles of the California border and well within the northern limits of the botanical range of sugar pine. The rust has not yet been found in California, nor is it known on sugar pine within its native range, although this tree is known to be highly susceptible. The range of the rust on western white pine in the "Inland Empire" pine region was not extended, although numerous additional infection centers were found.

Studies of damage in different height classes of western white pine show that the percentage of trees injured increases with size of tree. The youngest trees are killed in a few years, whereas 30 to 40 years from the time of infection may be required for killing the larger trees.

OTHER FOREST-TREE DISEASES

Brown spot disease of pine seedlings.—In spraying experiments in a field plantation of longleaf pine for the control of the brown-spot disease of pine seedlings, the average height of seedlings on the sprayed plots after 5 years is more than 10 times as great as on adjacent unsprayed plots. Since spraying is impracticable in most field situations, the burning over in winter of areas of longleaf pine seedlings has been advocated to destroy the old foliage, the principal source of infection for new needles in the spring. This treatment is made possible by the high resistance to fire damage possessed by longleaf seedlings before vigorous height growth begins. A single fire greatly reduces the disease for the first season and often to a lesser extent for the second, permitting foliage to be retained through its second season, a condition necessary for optimum seedling development. Controlled winter burning at 3-year intervals appears to be a useful measure where the disease is serious.

Root fungi.—A recently troublesome and previously undiagnosed root and collar disease of red pine in nurseries and plantations has been shown to be due to a phytophthora not previously known on conifers and perhaps entirely undescribed. The results of this study have removed confusion in diagnosis and make it possible to go ahead with a survey to determine whether this and other similar diseases are generally established or have been locally introduced from abroad and require quarantine action to prevent spread.

A study of tree mycorrhiza, root growths resulting from the invasion of specialized fungi, has been brought to the point where definite results are being obtained. A survey in the Allegheny region has shown that practically all the short roots of the most important forest and shade trees are heavily infected and commonly distorted by the fungi. Experimental proof of the formation of mycorrhiza has been obtained for 14 fungi, and others are under test. A method has been developed that makes it possible to determine which of the causal organisms is present in a particular case. This determination is a necessary preliminary to the intelligent study of their effect on the health of the trees, which in turn is a prerequisite to an understanding of the growth rate of trees and especially of their root diseases.

PREVENTION OF STAIN, MOLD, AND DECAY IN LOGS AND LUMBER

Continued work on the control of sap stains, molds, and storage decay in the South has resulted in further improvements in preventive methods. Two efficient treatments for the protection of freshly cut softwoods and three for hardwoods are now available. Progress was made in the adaptation of stain-control treatments to the use of small mills, which produce over 50 percent of the lumber cut from the Gulf States region. A brown interior stain of persimmon wood was found to be due to oxidation without fungus activity. A control treatment was developed, consisting of steaming for varying periods depending upon the size of the wood.

Two new treatments were found promising in the control of deterioration of logs during extended storage periods. Similar materials gave effective results as pretreatments for fence posts under 6 inches in diameter, to prevent deterioration during the air-seasoning period prior to pressure treatment with preservatives.

The value of stain-control treatments is indicated by the higher price differential suggested for dipped lumber under the National Recovery Administration code for the lumber industry. The wide adoption of such treatment by southern mills has materially raised the quality of their domestic and export products and reduced losses.

DIVISION OF FRUIT AND VEGETABLE CROPS AND DISEASES

E. C. AUCHTER, *in Charge*

The breeding, culture, and diseases of fruits, nuts, vegetables, and ornamental plants and their handling, storage, and utilization were subjects of continued investigation in numerous projects.

APPLES

Factors influencing biennial bearing.—Experiments continued through several seasons at Hancock, Md., and Wenatchee, Wash., indicate that in the case of

healthy, vigorous York Imperial apple trees, when one or more fruits set for each 25 good, healthy leaves, fruit buds fail to form for the next year. When there is one fruit to each 25 to 50 leaves, some fruit buds will generally form. With more than 35 leaves per fruit, enough fruit buds will usually form to make a good crop the next year. A heavy bloom may be expected the next year when there are more than 50 good leaves to each fruit. However, in order to induce development of fruit buds by thinning the fruit in a certain ratio of fruit to leaves, the thinning must be done within a restricted period after the fruit sets and must be sufficiently heavy to give a large excess of foliage as compared to fruit. The application of these general results should prove of interest to apple growers in their efforts to regulate and induce annual bearing of their trees.

Propagation from cuttings.—In experiments in apple propagation, the complete etiolation or blanching of the new shoots by growing them for a few weeks under conditions in which the tissues differentiate in complete darkness resulted in cuttings from such shoots rooting 100 percent. It has been discovered further that only certain portions of the spectrum need to be excluded in order to bring about the development of root primordia. The light waves at the violet end of the spectrum are apparently the ones that inhibit root primordia. This discovery is important in further work on the problem of propagating apple varieties from cuttings.

PEACHES

Shalil variety as understock.—An extensive test of the Shalil peach (F. P. I. 63850, introduced from India some years ago) to determine its resistance to nematodes has again shown its complete immunity. The test was made on land where ordinary seedling peach rootstocks developed root systems that were a mass of nematode galls. The Shalil has also proved to be much more resistant than other rootstocks to crown gall and the peach borer and has shown superior qualities as an understock, judged by the growth and performance of trees propagated on it.

Phony disease.—Further studies of the phony disease of the peach have added to the knowledge of its nature. It is definitely infectious and is caused by the presence of a virus in the root system. Its recent wide dissemination over the Southeast is attributable to the movement of infected nursery stock from districts where it has long been established. It is not artificially transmitted by inoculation with juices from diseased trees, but is invariably transmitted through the medium of a graft union between infected roots and the root system of the healthy tree. The incubation period for the peach is about 18 months, sometimes longer; for the plum, 12 months. The disease is intercommunicable among peach, plum, apricot, almond, and several other species. It is not transmitted through the soil, and replanting immediately following the removal of phony trees constitutes no hazard. Natural dwarf plants of peach and of closely related species are almost perfect symptomless carriers of the disease.

Variety tests for preserving and canning.—During the season of 1933 about 70 varieties and selections of peaches were tested for making preserves and about 40 varieties for canning. Some of the newer variety introductions are especially promising for both purposes. A good deal of information was accumulated as to the effects of stage of maturity, time and end point of boiling, proportions of fruit and sugar, and other factors upon texture and quality in preserves. One of the canning-type peaches developed at the New Jersey Station proved so promising that it is to be introduced to the trade through that station under the name Ambergem. These studies in conjunction with previous work now make available a fairly complete knowledge of about 75 varieties and selections of peaches in regard to their suitability for freezing, canning, and preserving.

PEARS

Moisture and productiveness.—Pear orchards on the heavier clay adobe soil in the Rogue River Valley of Oregon have sometimes failed to produce as well as their general cultural conditions would warrant. Investigations showed that the trees were suffering from insufficient moisture, even though the average moisture content of the soil was well above the wilting point. Two seasons' results show that under these soil conditions growth and fruit production can be increased by adequate irrigation.

Kieffer pears for canning and preserving.—Further experiments have confirmed previous findings that when Kieffer pears are ripened by storage at a temperature of 60° to 65° F., preserves or a canned product may be made from them which compares favorably with those from varieties ordinarily rating much higher in quality. A commercial firm, using information developed in the Bureau's work, canned 165,000 bushels of Kieffer pears with satisfactory results.

CITRUS FRUITS

Improved method of harvesting grapefruit.—The method universally used for the commercial harvesting of citrus fruits is to cut the fruit from the tree by means of clippers. Some clipper cuts occur, and some stems are left so long that they cause injury to other fruits during the processes of harvesting, grading, and packing. These wounds allow the entry of the blue and green molds that cause decay. During the year it was found from the Bureau's experiments in Florida that mature grapefruit can be pulled from the tree without injury to the peel, and that fruit so harvested will suffer less from stem-end rot in common storage than clipped fruit. Since pulling is faster and therefore cheaper than clipping, there seems to be good reason for making it the standard practice for grapefruit.

Degreening Satsuma oranges.—Investigations in Florida and Alabama have shown that Satsuma oranges subjected to the degreening treatment in rooms where the temperature is kept well below 80° F. will degreen satisfactorily without developing the soft scald so characteristic of this variety early in the fall. The lowered temperature did not retard degreening as much as might have been expected.

Borax treatment to prevent decay.—In a further study of the value of applying borax to citrus fruits before they are subjected to the degreening treatment, experiments in various packing houses have shown that the problem of having the borax solution strong enough to be toxic to decay organisms during cold weather can be met by keeping the concentration up to 10 to 12 percent. Another method that proved satisfactory was to treat the fruit in a small tank containing an 8-percent borax solution maintained at a temperature between 100° and 110° F.

STRAWBERRY BREEDING

In the further development of the cooperative strawberry breeding work there were made in 1933 from a great number of seedlings under observation, 230 selections at Glenn Dale, Md., 176 at Willard, N. C., and 15 at Corvallis, Oreg., for further testing and observation.

The strawberry varieties already introduced as a result of this breeding work have continued to prove their merit. The Narcissa in the Northwest and the Dorsett and Fairfax in Maryland, Delaware, New Jersey, and Pennsylvania were again superior to other varieties. The Blakemore is being successfully grown over a wide area from New Jersey southward and westward including southern California. The Redheart continues to attract attention in the Northwest because of its merit for canning and freezing, and the Southland is becoming an important local market and home-garden berry in the South.

FRUIT SPOT OF AVOCADO

Experiments in Florida indicate that successful control of fruit spot of the avocado can be accomplished by two or three monthly applications of bordeaux mixture beginning about the first of May. Late-maturing varieties may require additional applications. Studies of fruit-spot infection by *Cercospora* have added to the detailed knowledge of this disease. A perfect stage of the fungus has been discovered and its connection proved by inoculations.

PROTECTION OF FRUIT SHIPMENTS FROM FREEZING

Tests in the winter of 1933-34 confirmed those of the previous winter showing that the latent heat of fusion of water could be employed to protect pears from freezing in transit. Sawdust saturated with water was packed under and around the lower portion of the load in the car, and the heat liberated when this water was frozen in transit protected the fruit from freezing for 2 days longer than the use of dry straw and building paper as customarily employed. A large marketing organization successfully shipped from the Northwest to the

East about 40 cars of pears protected in this way. Two of the cars went to Montreal through zero temperature from the Mississippi River east and arrived with the fruit in good condition. On a certain day another of these cars was the only car of northwestern fruit arriving in New York without showing signs of freezing. Equally good results were obtained with similarly protected carloads of Delicious apples shipped from Wenatchee, Wash.

REMOVAL OF SPRAY RESIDUE

The problem of removing spray residue from apples and pears continued to be acute through the season of 1933, particularly with regard to lead and fluorine. Preliminary investigations in the preceding year had developed the practicability of several methods of removing lead, but very little work had been done on fluorine. Diverse spray practices necessitated new methods of washing the fruit. In the work of 1933 it was found that the most satisfactory treatments were (1) $1\frac{1}{2}$ percent hydrochloric acid plus 2 percent salt plus 1 percent light mineral oil at a temperature of 100° to 110° F. in a brush-flood machine, and (2) sodium silicate 70 pounds to 100 gallons of water at 110° with enough soap added to produce a foam, followed by $1\frac{1}{2}$ percent hydrochloric acid at 100° in a double-process machine. In many cases the addition of a detergent or degumming agent to hydrochloric acid in a flotation machine made heating unnecessary. Some of the washing treatments caused injury to the fruit, particularly Jonathan and Delicious apples. It was found that most of the damage was due to heat and to dissolved arsenic or fluorine materials. Against fluorine it appears safer to use sodium silicate followed by very thorough rinsing. No washing method was found to be effective when cryolite or other fluorine sprays had been used in more than the last 2 or 3 cover sprays. The maximum temperature to which the washing solution could be heated without causing injury was determined for the principal varieties of apples and pears grown in the Pacific Northwest. On eastern-grown apples no particular difficulty was experienced in removing residues of lead and arsenic with 0.5 percent hydrochloric acid except where oil had been applied with the lead arsenate, in which case the solution had to be heated or a detergent used.

NEW FUNGICIDES

Of the new fungicides and the modified older fungicides tested, copper phosphate combined with bentonite-lime is the most promising in both killing power and harmlessness to host plants. Encouraging results were obtained with it on apple, peach, plum, cherry, grape, and pecan.

PECANS

Cutting back before top-working.—Because of the importance of improving native pecan trees by top-working them to selected varieties, an experiment was carried out to determine the optimum degree of cutting back to get the best results from top-grafting old trees. Trees cut to stumps nearly all died back to the ground and sprouts grew up from the roots. In trees cut to the first and second forks the large cuts have not begun to heal, buds and grafts have constantly blown out, and little rebuilding of the tops has been accomplished. In trees cut to the third and fourth forks the cuts have practically healed and sufficient tops have been rebuilt to begin bearing. From all data it is indicated that large pecan trees should not be headed more severely than to the third forks prior to top-working.

Disease control.—Experiments for the control of pecan diseases were continued, with the cooperation of the Bureau of Chemistry and Soils in certain phases. In Louisiana in 1933, trees of the Stuart variety were sprayed once, May 19, with a 4:4:50 bordeaux mixture for the control of the liver spot and downy spot diseases, and some of the trees received fertilizer. The foliage remained on the sprayed trees until frost, October 25, while unsprayed trees were defoliated by September 1. The unsprayed, unfertilized trees averaged 13.7 pounds of nuts; the sprayed, unfertilized trees 21.8 pounds; the unsprayed, fertilized trees 34.8 pounds; and the sprayed, fertilized trees 52 pounds.

In efforts to control pecan rosette, zinc sulphate was the most promising of many treatments tried. Applied as a spray, or by inserting the dry salt into the tree trunks, or to the soil, it resulted in striking recovery of rosetted trees. The spray gave the most uniform results.

INCREASING YIELDS OF PERSIAN WALNUTS

Cross-pollination is important in obtaining satisfactory yields of Persian (English) walnuts because the staminate and pistillate blossoms of most varieties do not mature at the same time. For cross-pollination it is necessary to provide catkins that mature pollen simultaneously with the receptive condition of pistillate blossoms. Several hundred acres of trees were thus artificially pollinated in 1933. Yields were greatly increased in all instances, even in orchards heavily infested with blight, the increase ranging from 30 to 900 percent as compared with corresponding blocks of trees not cross-pollinated. The feasibility of transporting catkins from one district to another for pollination has been established.

ADVANCES IN VEGETABLE CULTURE AND DISEASE CONTROL

Variety standardization.—Cooperative work on the standardization of the principal varieties of some of the major truck crops has been in progress for several years. Concrete results became available during the year through the issuance of three publications describing and illustrating types of the principal American varieties of tomatoes, cabbage, and peas. It is believed that the information in these publications will do much to improve the crops to which they relate, by aiding in the elimination of inferior strains and types now in the seed trade. Similar studies on onions, carrots, beets, and spinach are under way.

Preserving vitality of onion seed.—Studies extending over 4 years have shown that thoroughly dried onion seed stored in sealed containers will retain germination power and vitality practically equivalent to that of fresh seed for that length of time. Although air-tight containers would be more expensive than the bags commonly used, the expense seems justified for seed to be shipped into humid regions, where there is sometimes a serious loss in germination and vitality in a few weeks to a few months.

Celery mosaic.—In Florida celery mosaic has been found to affect 17 different crops, including pepper, sweet corn, squash, spinach, beets, and carrots, as well as 16 ornamental plants and 10 weeds. It has already been established that the disease is spread by at least four kinds of aphids. These facts disclose a greater problem than was originally supposed. Vigilant attention to weed control and general field sanitation is indicated as the most practicable way to control this serious disease.

Disease-resistant lettuce and melons.—Two additional strains of lettuce of the Iceberg type and one strain of the Honey Dew type of melon that are practically immune to certain serious field diseases occurring in southern California and other southwestern producing sections have been introduced. These varieties also give promise of producing better crops of better shipping and eating qualities than varieties previously grown.

Puffiness of tomatoes.—Definite progress has been made toward determining the conditions responsible for producing puffy tomatoes. There are apparently two stages. The trouble probably is started by conditions affecting the fertility of the flower, as indicated by the fact that only partly fertilized flowers or fruits develop typical puffs. The second stage is due to the influence of temperature and soil moisture on the poorly fertilized fruit. Under conditions unfavorable for flower fertility, high soil moisture is conducive to the development of puffiness.

Control of bacterial canker of tomatoes.—Studies in Utah have confirmed previous results showing that practically complete prevention of the distribution of bacterial canker of tomatoes through infected seed can be attained by the simple and thoroughly practicable method of fermenting the seed for 24 hours or longer in the process of extracting it from the pulp. The disease will not carry over in the field longer than 2 years, therefore a 3-year rotation will eliminate the infection provided no diseased material is introduced. In case of doubt as to freedom of seed from disease, seed-bed sanitation is important. Formalin dust in the seed bed reduced infection from 35 percent to a fraction of 1 percent.

Two new bean stocks released.—During the winter small quantities of seed of a new mosaic-tolerant early Refugee type of bean and of an improved strain of Henderson bush lima bean were distributed to a large number of seedsmen for testing and for use as foundation stocks if desired. The early Refugee type is mainly important for canning, although it is good for market-garden and

truck use in certain sections. Though not immune to mosaic, it shows considerable resistance and suffers no noticeable reduction in growth or yield as a result of infection. It is about 2 weeks earlier than Refugee. The released strain of Henderson bush lima is not markedly different from the best individuals in present stocks, but is an improvement by reason of its high uniformity and its tendency to produce a maximum proportion of usable pods at the time it is cut for canning. The seeds hold their color better than stocks now in use.

Bean diseases.—Experiments have definitely shown that the mosaic diseases of white clover, alfalfa, and peas are transmissible to beans. Red-clover mosaic is not transmissible to beans. It has been found that bean seed not infected with halo blight can be safely planted 10 to 15 days earlier than infected seed. Powdery mildew of beans was controlled in the fall by dusting the foliage with a 75-percent sulphur dust when the disease first appeared. Either hydrated lime or colloidal clay is used as a diluent of the sulphur.

BULB CULTURE

Two new hybrid lilies, Peter Puget and Cyrus Gates, derivatives of 3: west coast species, were added to the 5 that the Bureau had previously placed with growers for working up stock for the public. Nine more hybrids have been selected, named, and propagated to some extent.

Studies in forcing daffodils, iris, and hyacinths have shown remarkable responses to cold treatment of the bulbs during storage. The general practice is normal storage through July, 50° F. during August, potting September 1, and rooting in a cool situation around 50° until late November. With such treatment blossoms appear in ample time for Christmas. Earlier blossoming is possible but of doubtful desirability. In the experiments daffodils were in blossom by the middle of November and Wedgewood iris the middle of October. The work also showed conclusively that a 50 degree temperature applied to the early trumpet daffodils from July 1 on tends to inhibit rooting and causes undesirable dwarfing. Daffodils, therefore, are best not subjected to low temperatures as soon as dug, but should have the flower bud developed to visibility first. This will usually be accomplished by August 1 in ordinary warm storage.

DIVISION OF GENETICS AND BIOPHYSICS

G. N. COLLINS, *in Charge*

STUDIES OF INHERITANCE

A large part of the work of this Division has for its object a better understanding of inheritance in plants. Experiments with maize and its wild relatives are conducted in Maryland, Virginia, Florida, Arizona, California, and the District of Columbia. The results, however, are not limited geographically, nor are they restricted to maize. The choice of this plant as a subject for study was made because maize provides the most suitable material for genetic investigations. Investigations are continuing on inheritance in perennial teosinte-maize hybrids, where differences in chromosome number permit further insight into the mechanics of the transmission of characters.

PHOTOCHEMICAL REACTIONS IN SEED GERMINATION

In experiments in cooperation with the Division of Seed Investigations, certain lots of lettuce seed have been found that fail to germinate with conventional methods but will germinate perfectly if after they have imbibed water they are exposed for a few seconds to sunlight. Investigation of the nature of this phenomenon has disclosed that radiation in only the red end of the spectrum is effective in promoting germination of these samples of seed. It has been found further that ordinary lettuce seed which germinates in the dark will no longer do so if when presoaked it is given a short exposure to radiation in the blue end of the spectrum. However, such treated seed can again be made to germinate in the dark if reexposed to red light. Seed that requires an exposure to red light before it will germinate in the dark can be prevented from germination by an exposure to blue light. It has been found also that seeds other than lettuce have somewhat similar reactions.

The nature of the light involved in these curious and novel reactions has been investigated, and it has been found that the wave lengths affecting germi-

nation of lettuce seed are those that offset rancidity in oils. Further, from the wave lengths involved it would appear that the reactions are intimately related to photosynthesis. These investigations, which are continuing, not only have a far-reaching importance in gaining an understanding of the physiology of germination but may be expected to contribute to the solution of some of the perplexing problems of photosynthesis and phototropism.

DIVISION OF MYCOLOGY AND DISEASE SURVEY

C. L. SHEAR, *in Charge*

PLANT DISEASE SURVEY

The Plant Disease Survey is a continuing project carried on with the cooperation of collaborators throughout the country, most of them connected with State stations and departments, for collecting and distributing information as to the appearance, extent, and geographic distribution of plant diseases. Probably the most outstanding service during the year was the aid given in the rapid surveys that followed the discovery of the Dutch elm disease in New Jersey, including the detail of experienced personnel for field and laboratory work. Pathologists and others interested were kept continually informed of the progress of the survey by reports and maps in the Plant Disease Reporter.

Losses from plant diseases were unusually high on important agricultural crops in the eastern part of the United States in 1933. The most notable instance was the continued severity and extended range of Stewart's bacterial wilt of corn.

MYCOLOGICAL STUDIES

During the year 6,604 specimens were added to the fungus herbarium. An inventory showed that the Bureau's mycological collections, including associated collections, contained 350,092 specimens representing 23,738 species.

Critical studies of fungi causing diseases of plants are constantly under way. The genus *Sphaceloma*, which includes many species causing important diseases of a number of economic plants (e. g., citrus scab and avocado scab), has received special attention. The Bureau of Entomology and Plant Quarantine is supplied with all available data on foreign species, with a view to preventing their introduction into this country.

MUSHROOMS

A difficulty in mushroom growing in recent years is the scarcity of horse manure. In experiments to find a satisfactory substitute, compost containing dried blood gave higher yields than that with wheat and bran. The results warrant trial in commercial mushroom houses.

DIVISION OF NEMATOLOGY

G. STEINER, *in Charge*

In the studies of the nematodes (minute eelworms) that infest the roots and other parts of plants and often do serious injury to important crops, emphasis has been placed on practical aspects.

The sugar-beet nematode in the United States has been generally considered an immigrant from Europe, perhaps introduced on sugar-beet seed. There has been a puzzling difference, however, between its behavior there and in this country, as in Europe it attacks other crops (potatoes, beans, peas, wheat, rye, barley, etc.) which are immune here. Recently a Bureau nematologist has found that it is harbored by a native weed, shadscale, in the Utah desert. This discovery indicates that the pest is probably indigenous to that region, and it explains the difference above noted and also the perplexing presence of nematodes attacking sugar beets grown on primeval land where shadscale formerly grew. Since shadscale belongs to the same botanical family as the sugar beet, it would be easy for the nematode to transfer from the former to the latter, whereas the shadscale may have been its host for so long that plants outside the family would have no attraction for it. Although the matter may seem rather theoretical, it has far-reaching practical significance. A farmer

considering planting sugar beets on virgin land with shadscale on it will know that it may be unsafe. The same weed in rotation plantings may carry the nematode over the rotation period and therefore should be entirely cleaned out. This knowledge helps materially in the proper planning of a rotation scheme.

In cooperative investigations with the South Carolina station certain nematodes have been found to play a primary part in causing the so-called "sore-shin" disease of cotton seedlings.

DIVISION OF PLANT EXPLORATION AND INTRODUCTION

B. Y. MORRISON, *in Charge*

PLANT INTRODUCTION

The special activities of the plant-introduction project are to obtain from foreign and domestic sources, by exploration, purchase, and exchange, new and valuable economic and ornamental plants that give promise in themselves or in the hands of plant research workers of making valuable contributions to the agriculture of the United States. The plant material is carried through the necessary stages of quarantine and propagation in the various introduction gardens of the Division before it is distributed to research workers.

Approximately 2,300 introductions were inventoried during the fiscal year. These comprised 687 varieties of deciduous fruits, 110 varieties of vegetables, and a much larger number of cereal and forage plants. Most of this material was introduced at the specific request of research workers to further their investigations. There have also been numerous introductions of ornamentals and miscellaneous collections obtained through collaborators and correspondents. Material released and distributed to research workers and collaborators during the year amounted to 66,130 items, in the form of plants, seeds, roots, and tubers.

At the close of the year the Division had 7 men in the field—6 in Asia and 1 in South America—collecting much-needed material. In central and eastern Asia the search includes soil-binding plants that may be useful in combating soil erosion and also in range improvement, and in tropical South America plants having insecticidal properties.

BOTANICAL INVESTIGATIONS

Over 11,000 specimens of economic plants were identified for other branches of the Department, for experiment stations, nurserymen, and foresters, and for botanists in this and other countries.

A very important work completed and sent to the printer during the year is a manual of the grasses of the United States by A. S. Hitchcock. It represents years of work and includes the classification, description, illustrations, and synonymy of the species, their distribution by States, and their economic uses.

Plants containing rubber.—The work of furthering the possibility of domestic rubber production has been actively pushed. Results of chemical analyses of various species of goldenrod were published in the *Journal of Agricultural Research*. Field selections of the most promising species were carried out. The rubber-yielding *Cryptostegias* have continued to yield valuable information in field tests made in Florida.

Blueberry improvement.—Experimentation on the blueberry in developing higher yielding and better fruits has progressed favorably in Massachusetts and North Carolina. Hybrids made between northern and southern varieties several years ago are now beginning to fruit and indicate good possibilities in developing better strains for the South. From seedling selections made in Massachusetts a new variety, the Wareham, has been developed. It is very large-fruited (three-fourths of an inch in diameter) and yields abundantly under New Jersey conditions.

PLANTS FOR EROSION CONTROL

As an aid to the demonstration projects connected with soil-erosion investigation, the Bureau began during the year a special study of grasses, herbs, trees, and shrubs suitable for planting to check soil erosion. For this purpose 12 experiment stations, known as plant reserve stations, have been or are being established near the various demonstration areas, so that the plants will be

tested under the same conditions under which they are to be used. The objects are to study new plants to determine their value for soil binding and for preserving and utilizing marginal and submarginal land, and to develop methods of propagating at low cost those found useful for these purposes. The work so far done has consisted mostly of acquiring land for the stations, organizing the work, and collecting promising plant material. The funds for these stations were provided by a Public Works allotment.

NATIONAL ARBORETUM

Prior to 1930 there had been purchased for the National Arboretum 190 acres of land. In 1933 an additional 184 acres were obtained, leaving 12 acres to be obtained by condemnation proceedings, besides 640 acres of marsh along the Anacostia River to be derived through reclamation.

The real operation of the Arboretum has not yet begun, inasmuch as only a small sum for maintenance has so far been allotted. Detachments from the Civilian Conservation Corps have improved the land considerably by clearing debris, laying roads, and constructing bridges, culverts, and drainage ditches. Through allotments of emergency funds further work of this general nature was accomplished. The formulation of plans for the development of the Arboretum is well in hand, and as soon as funds are available there need be no delay in proceeding with them.

DIVISION OF SEED INVESTIGATIONS

EDGAR BROWN, *in Charge*

SEED TESTING

The examination of seeds has been continued as in previous years in the central laboratory at Washington, D. C., and in the cooperating laboratories in California, Indiana, Missouri, and Oregon. In each of these places samples of agricultural seeds are analyzed for pure seed and weed seeds, tested for germination, and identified. During the year such examinations were made of 20,205 samples.

In cooperation with the New Zealand Seed Laboratory it has been found that seed of Chewings fescue when dried and shipped in specially lined bags is protected from high moisture during shipment and arrives in good condition, and that it retains germination better than moist seed shipped in cold storage.

An extensive study of the storage of soybean seed under commercial conditions in different localities is under way. After a year's storage, differences in germination between varieties and between localities of storage are evident. Preliminary results indicate the rapid loss of viability at summer temperatures (86° F.) when the seed contains 14 percent or more of moisture.

Studies on the fundamental factors involved in the germination of seed of *Poa compressa* (a seed that requires alternation of temperature, exposure to light, and chemical stimulation with dilute nitrate solution for prompt and complete germination) have been continued. Keeping the seeds in an atmosphere of carbon dioxide for the first week of the germination period was beneficial to germination both in the light and in the dark. Ozonized air, ozonized oxygen, and nitrogen were also found to be beneficial.

This division cooperated with the Division of Genetics and Biophysics in a study of the effect of light on the germination of seed, as reported under the heading of that division.

ENFORCEMENT OF THE FEDERAL SEED ACT

Import provisions.—All importations of seeds subject to the Federal Seed Act are sampled by the Customs Service, the samples are tested for quality by this division, and the collectors of customs notified of the results. During the fiscal year samples of 643 lots, representing 13,529,300 pounds, of forage-crop seeds were so examined. Of this amount, 628 lots (13,150,300 pounds) were permitted entry and 15 lots (379,000 pounds) were rejected. There was practically no importation of seed of alfalfa, red clover, and alsike clover, owing chiefly to the present import duty.

Interstate shipment of misbranded seeds.—In the enforcement of section 6 of the Federal Seed Act, 8 criminal prosecutions and 26 seizure cases were

reported by the Department of Justice as terminated, and 21 criminal cases and 12 seizure cases were pending at the close of the fiscal year. Investigations of about 52 cases reported by various States as violations of the act were also pending.

During the year a policy of giving wider publicity to actions for violations of section 6 was adopted, by releasing reports of such cases to the press. The issuing of press articles dealing with seed buying in general, designed to help buyers to avoid purchasing misbranded seed, has been continued.

DIVISION OF SUGAR PLANT INVESTIGATIONS

E. W. BRANDES, *in Charge*

SUGAR BEETS

Range improvement may reduce curly top.—Ecological studies in Idaho, California, and Utah, in cooperation with the Bureau of Entomology, have determined the original vegetation of the present breeding areas of the beet leaf hopper, the successions that occur when overgrazing and other types of denudation are prevented, and the time required for rehabilitation of the range. It has been found that only a very few years of control are needed to improve range conditions markedly and to alleviate greatly the curly-top situation by displacing the host plants on which the leaf hoppers (carriers of the curly-top disease) breed and maintain themselves. In view of the present interest in range restoration and removal of marginal lands from cultivation, these studies furnish important basic information for improvement of the grazing lands tributary to beet areas.

Value of new variety confirmed.—The third year of intensive testing of the U. S. No. 1 variety of curly-top-resistant sugar beet, together with widespread company plantings, has confirmed previous experience that this variety has marked resistance to curly top and is generally satisfactory for commercial use. Under non-curly-top conditions it has been slightly lower in tonnage than certain high-yielding commercial brands, but by higher sucrose percentage it has practically compensated for the difference in yield.

Curly-top studies.—In the study of the nature of the curly-top virus, the discovery of improved methods has made possible important advances in the knowledge of the curly-top disease. It has been found that the infective principle can be precipitated from the juice of diseased plants by means of alcohol. In the new line of experimental attack opened by this discovery, a dilution study of the virus in the phloem exudate in comparison with the virus precipitated from the juice of diseased beets and that from an extract of viruliferous leaf hoppers was made. The phloem exudate was found to have the virus in the most concentrated form.

Chemical studies on the nature of resistance to curly top have been focused on a substance or group of substances found in juices of plants and having the property of inactivating curly-top virus. The inactivating substances, provisionally called "resistenes", have been obtained from extracted juices of certain sugar beets and other plants by chemical fractionation. Certain highly resistant plants, such as Australian saltbush, have been found to contain comparatively high amounts of the inactivating substances. The "resistenes" apparently are organic compounds but are probably nonprotein in nature. They have been found soluble in water, alcohol, and ether and apparently are thermostable. In many of their characters they behave as organic acids.

Sugar-beet genetics.—Progress is reported in genetic studies on the sugar beet, which have important bearings in furnishing an understanding of the inheritance of certain characters and in the practical problems of producing improved strains. Certain color characters have been found to be of simple Mendelian type, and a factor for curly-top resistance has been shown to be linked with the simple Mendelian character for red color. A linkage between certain color characters and a factor for bolting has also been shown. Studies on the complex problem of cross- and self-sterility have yielded some interesting developments. Self-sterility appears to be due to a simple Mendelian factor, and this character is being transferred to lines of economic value.

Leaf-spot-resistant variety.—A new sugar-beet variety definitely improved with respect to leaf-spot resistance is ready for release for commercial increase in the fall of 1934. Several highly resistant lines of sugar beet stabilized with respect to resistance and high in sucrose quality have been found. In the

course of the inbreeding necessary to secure these stabilized lines, loss of yielding capacity has occurred, but hybrids obtained by intercrossing these lines have given gratifying returns in vigor in the first hybrid generation.

SUGARCANE

New variety gains favor.—A pressing demand for seed cane of the sugarcane variety Co. 290 was experienced soon after the announcement of release for commercial planting in the fall of 1933. This variety was imported from southern India and after careful tests for many years was found well adapted to culture in the so-called "black lands" of Louisiana. Because of high yields of cane of satisfactory quality and low fiber content, which is desirable from the milling viewpoint, the variety was recognized by planters as filling a definite need, and 2,900 applicants received 3,500 tons of seed cane propagated in cooperation with the Louisiana station and the American Sugar Cane League.

New method of storing harvested cane.—An improved method of storing supplies of harvested sugarcane, developed in cooperation with the Bureau of Chemistry and Soils, was introduced on a plantation scale in the fall of 1933 and gives promise of eliminating in large measure the idle periods of the mills, and consequent losses, when wet weather interrupts harvesting and grinding of the cane. Rapid deterioration of cane stored in mill yards has heretofore discouraged the building up of reserves for milling during bad weather. The method consists of sprinkling with water piles of cane at derricks and mill yards, or in cars and barges, thereby reducing to a minimum the evaporation of water and in turn the inversion of sucrose. A report of the experiments is in press as Technical Bulletin 449.

Treating frozen cane.—Experimental studies on methods of treating sugarcane frozen early in March when in advanced stages of development indicate that where the cane has attained stem development sufficient to permit growth of aerial shoots from surviving buds, removal of all damaged aboveground growth was beneficial. In lesser stages of development, removal of the frozen growth exerted no beneficial effect and in many instances resulted in decreased yields of cane and sugar. A report on the studies was prepared for publication (Circular 324).

Biology of mosaic virus.—In studies on the interesting phenomenon of recovery from mosaic, which has been observed in some varieties of sugarcane, it was found that juice from the inner rolled leaves just above the growing point of the stem exerts an inhibiting effect on virus used for inoculation. Juice from this source, whether from resistant or susceptible varieties, had the same inactivating effect when mixed with virus. It is believed to be the first evidence of a definite protective substance in the host plant which antagonizes the virus and because of its localization may explain the discontinuous nature of recovery. Ultraviolet light in moderate doses does not inactivate the virus. It was found possible to preserve the virus at low temperatures for at least a year by preliminary quick freezing in chambers containing solidified carbon dioxide. The virus when thawed out was as effective as freshly extracted virus.

Serious new type of mosaic.—A type of mosaic much more destructive than the previously recognized strain of this disease appeared during the year and has already been found in four localities in Louisiana. Varieties recommended by the Bureau because of resistance to mosaic and now extensively grown are severely injured by it. Investigations looking toward control of the new form, which is provisionally designated as type 3, were promptly begun.

DIVISION OF TOBACCO AND PLANT NUTRITION

W. W. GARNER, *in Charge*

TOBACCO CULTURE

Fertilizers.—Tests with highly concentrated materials such as ammonium nitrate, urea, nitrate of potash, potassium phosphate, and ammonium phosphate as fertilizer for tobacco indicate that products of this type are suitable sources of readily available nitrogen, potash, and phosphoric acid, but as a rule for use on light soils they will need to be supplemented with other materials supplying nitrogen in less soluble form and with certain additional elements such

as calcium, magnesium, sulphur, and chlorine and very small quantities of boron. Specific requirements depend on the type of tobacco as well as the type of soil. It appears that with proper precautions highly concentrated synthetic materials can be used to advantage for the production of high-analysis fertilizer for the tobacco crop.

Cropping systems.—Investigation has shown that although proper fertilization may maintain a satisfactory yield of tobacco more or less indefinitely on most soils, the quality of the product is likely to deteriorate seriously unless organic matter of the proper kind is added to the soil. Except for certain types of tobacco, cropping systems employing the usual soil-improving crops do not produce high-quality leaf even though good yields are obtained. On the other hand, the tobacco crop following a natural weed fallow of 1 or 2 years or longer usually is characterized by an exceptionally rapid and even type of growth which is distinctly favorable to production of a leaf of desirable quality. With the Maryland type of tobacco, weed fallow has increased the value of the crop 200 percent.

Nicotine content.—Observations over a period of years show that the content of nicotine in tobacco varies considerably in different strains, in different parts of the plant, and under different conditions. Nicotine accumulates most rapidly in the leaf during the later stages of growth, so that in earlier stages the lower leaves are richest in it, but ultimately they are surpassed by the upper leaves. The percentage in the midrib is much lower than in the web of the leaf, and the plant stem contains somewhat less than the leaf midrib. Suckers or axillary branches have low nicotine. Dry conditions and abundant sunlight tend to increase the nicotine; close spacing reduces it. Topping, especially early and low topping, greatly increases it. The dark fire-cured and air-cured types contain most nicotine, and the Maryland type the least. Quick drying of the mature leaf with heat greatly reduces the loss of nicotine that normally occurs in the slow air-curing process. The cured leaf suffers a small initial loss of nicotine upon standing, after which the content becomes stabilized.

Chemical and physical characteristics.—Comparative studies with cigar binder and filler leaf and the Maryland and flue-cured cigarette types of tobacco indicate that marked difference in the quantity of fertilizer nitrogen is an important factor in the contrast between the two classes in chemical composition and in such commercial important properties as color, elasticity, combustibility, grain development, aroma, thickness, and weight per unit area. Differences in quantity and composition of ash also are important in certain respects. Cigar tobaccos are high in nitrogenous constituents, organic acids, and ash, but contain relatively small quantities of carbohydrate. The reverse obtains in the Maryland and flue-cured tobaccos. The latter types differ in chemical composition mainly in that the flue-cured contains high sugar and starch, while the Maryland is rich in pectin and cellulose and relatively low in nicotine. These differences in chemical composition can be correlated in large part with differences in the above-mentioned commercially important properties.

TOBACCO DISEASES

Mildew (blue mold).—In repeated cooperative experiments excellent control of the tobacco mildew, or blue-mold disease, was obtained by heating the beds to raise the night-air temperatures above 70° F. during periods favorable for disease activity. The experiments indicate that it is not necessary to start heating until after the disease appears, and that relatively crude methods of supplying heat may be used, since wide fluctuations of temperature are permissible, provided the general average remains above the critical point. Temperatures around 60° F., plus quiet, foggy weather, are most favorable for the disease. Experiments with different types of plant-bed construction indicate that it may be possible to prepare beds so that the heat can be used in early spring to sterilize the soil and protect against frost and later to protect against mildew. Comparing beds covered with glass, sash, glass substitutes, and cotton, the sash gave the best mildew control and also the most rapid growth of plants. A glass-covered bed at Oxford, N. C., produced plants large enough to set out 46 days after seed sowing—a remarkably short period. Spraying experiments were continued cooperatively at Tifton, Ga., Oxford, N. C., and Upper Marlboro, Md. Of the many sprays tested, copper-molasses (colloidal copper), copper-soap, and calcium monosulphide gave better results than the standard bordeaux mixture. All but copper-molasses caused stunting,

however, and none gave effective control in all experiments; so definite conclusions regarding spraying are not yet possible.

Leaf spot.—Investigations during the last several years have shown that the most destructive forms of leaf spot are caused by bacteria, *Bacterium tabacum* producing wildfire, and *B. angulatum* blackfire. Fertilization and topping practices have been found to have a marked effect in predisposing tobacco to leaf-spot attack. Low nitrogen supply reduced susceptibility, and high nitrogen increased it. The action of potash was just the reverse. Susceptibility was greatly increased by low topping and reduced by high topping. A combination of low topping and high nitrogen supply produced maximum plant susceptibility—and these are essentially the cropping practices followed in localities that suffer most from leaf spot. Heavy, driving rains make the leaves susceptible to attack; consequently, with cultural conditions that produce a susceptible type of growth, and the organism present, a severe rainstorm is almost certain to result in a destructive outbreak of leaf spot.

DIVISION OF WESTERN IRRIGATION AGRICULTURE

C. S. SCOFIELD, *in Charge*

AGRONOMIC INVESTIGATIONS

Field studies and experiments are carried on at six field stations to determine the crops, rotations, cropping methods, soil treatments, and irrigation practices best suited to the millions of acres of irrigated lands in the West. Valuable data have been accumulated from a series of 150 crop rotation and tillage experiments, most of them continuous since 1912, which have been a strong influence in the adoption of improved farm practices throughout the irrigated regions. In this connection, results bearing on the cotton root-rot problem in Texas are being made available by the publication (Technical Bulletin 436) of the results of a series of 27 rotation and tillage experiments conducted for 21 years at San Antonio, Tex.

It is becoming increasingly apparent that irrigation agriculture is essentially different in certain economic aspects from agriculture under humid conditions. Where climatic and other conditions are favorable, the possibilities of high-priced crops of a less competitive nature continue to be an important phase of these investigations. Pima Egyptian cotton, adapted to extensive irrigated areas in the Southwest, is a noteworthy example. As a result of work done at one of the stations, the plant from which the drug santonin is derived has been introduced in that area and the product is being turned out in commercial quantities. At some of the stations new grass mixtures for permanent pastures have been introduced, and the importance of sweetclover both for pasture and as an aid in land reclamation has been demonstrated.

BORON IN IRRIGATION WATER

Results of investigations of the problems of boron in irrigation water in California have made it possible in many instances for users of boron-contaminated waters to select crops with boron tolerances more suitable to their conditions. A wide diversity in tolerance has been found. Lemons will withstand little above 3 parts and asparagus upward of 100 parts per million in the soil solution. The 60 to 70 other crops tested showed tolerances for the most part between these extremes. It has been demonstrated for the first time that the rootstock upon which trees or annual plants are grafted has a marked effect on the absorption of boron by the scion variety. Increasing the available nitrogen serves in a measure to reduce boron absorption by and injury to citrus trees. A procedure for measuring the concentration of boron in the soil solution has been developed.

It has been found that the boron concentration in irrigation water is increased threefold to tenfold in the soil solution as the water applied is dissipated by transpiration and evaporation. A part of the applied boron remains in the soil solution, from which it may be absorbed by plants to their detriment, and a part is fixed by the soil in slowly soluble forms.

A report of an extensive study of boron in irrigation waters in the San Joaquin Valley of California is in course of publication as Technical Bulletin 448.

EXPERIMENTAL GREENHOUSES

J. W. BYRNES, *in Charge*

The project of Experimental Greenhouses has continued its service of maintaining the greenhouses on the Department grounds, supplying facilities for plant research by the Bureau staff, propagating plants, providing ornamental and flowering plants for the main building and adjacent grounds, and general horticultural care of the grounds. Thirty-two greenhouses were maintained for experimental work with a wide range of plants, both economic and ornamental. Plants were supplied to ornament the patio of the Administration Building. The thirty-second annual chrysanthemum show (Nov. 1-8, 1933) and the twenty-first annual amaryllis show (March 26 to Apr. 2, 1934) were features of special interest and attracted large numbers of visitors. The breeding work with floral plants has resulted in some fine new varieties.

ARLINGTON EXPERIMENT FARM

E. C. BUTTERFIELD, *Superintendent*

The Arlington Experiment Farm, situated on the Virginia side of the Potomac River opposite Washington, D. C., comprises about 350 acres and provides facilities for experimental projects requiring farm and field conditions. Most of the investigations form a part of the research work of the Bureau of Plant Industry, although facilities are also afforded for certain experiments by other bureaus of the Department. Besides field plots, there are laboratories, greenhouses, barns, shops, and refrigeration and storage buildings.

Among the more important activities of the year in the Bureau's projects were the following: Agronomic and pathologic investigations of cereals; studies of various types of mulches; experimental culture of medicinal, insecticidal, and oil plants; forage crop and disease investigations (lespedeza, soybeans, sweet-clover, red clover, alfalfa, vetch, and crotalaria); studies of resistance of chestnuts to blight and other diseases; experiments in the storage and utilization of fruit and vegetable crops; studies of the germination and identity of seeds; experiments in the control of mushroom diseases; studies of diseases of sugar beets and sugarcane; growing sugarcane plants in quarantine; and studies of the effect of length of day on plant growth, flowering, and fruiting.

COOPERATION IN EXTENSION WORK

In addition to its educational work through its various divisions, the Bureau cooperates with the Office of Cooperative Extension Work and the State extension services in making available the results of its researches and in helping people in general to obtain the benefits of improved practices in plant-disease control, horticulture, and agronomy. Three extension specialists in these subjects are cooperatively maintained, who have continued to keep in contact with extension workers in the States and assist them in their work of helping farmers to cut production costs, grow higher grades of the various crops, and improve the keeping quality and marketability of their products.

PUBLICATIONS AND OTHER INFORMATIONAL SERVICE

One hundred and forty publications (122 new and 18 revised) contributed by the Bureau to the Department series were issued during the year. These included 51 papers in the *Journal of Agricultural Research*, 14 technical bulletins, 25 farmers' bulletins, and 50 other items of a semitechnical or popular nature. In addition there were printed in outside scientific, agricultural, and commercial publications 377 articles written by members of the Bureau's staff on various subjects related to its field of activity. A list showing the new official publications and the outside contributions is appended.

The Department's Press Service was supplied with many items of information and with material for numerous articles of timely interest for release to the agricultural and general press. Some of the Bureau's specialists also contributed largely to radio broadcasts through the Radio Service. Two special series of talks, one on pastures and forage and the other on cotton improvement, were prepared and broadcast in connection with the adjustment program. The weekly talks on the Garden Calendar have proved to be a popular feature

of the National Farm and Home Hour. Numerous items on gardening, fruits, vegetables, care of home grounds, and other plant subjects were also supplied for the Farm Flashes and for other use by local radio stations.

LIST OF PUBLICATIONS

FRUITS

- Fruit work through the years with the Federal Bureau of Plant Industry. By W. A. Taylor. Amer. Fruit Grower 54(5) : 9, 23-24.
- Hydron concentration changes in relation to growth and ripening in fruits. By J. S. Caldwell. U. S. Dept. Agr. Tech. Bull. 403.
- A preliminary report on root growth studies with some orchard trees. By C. F. Kinman. Amer. Soc. Hort. Sci. Proc. 29 : 220-224.
- Economical and effective orchard soil management. By J. R. Magness. Hoosier Hort. 16 : 51-56.
- Orchard trials of nitrogen and phosphorus. By E. L. Proebsting and C. F. Kinman. Amer. Soc. Hort. Sci. Proc. 30 : 426-430. (With Univ. Calif.)

APPLE

- Necessity for studying individual orchards. By E. C. Auchter. Valley Fruit Grower 1(2) : 7, 10.
- Apple bud variations. By A. D. Shamel, C. S. Pomeroy, and J. T. Bregger. Better Fruit 28(3) : 6, 12; (4) : 3-4. (With State Col. Wash.)
- Factors influencing the variability of apple trees in the nursery row. I. Time of bud start. By F. E. Gardner and F. B. Lincoln. Amer. Soc. Hort. Sci. Proc. 29 : 367-370. (With Univ. Md.)
- Studies on the interrelation of leaf areas, soil moisture, and nitrogen to fruit growth and fruit bud formation in the apple. By C. P. Harley and M. P. Masure. Northwest Fruit Grower 5 (10) : 11, 14.
- Relation of soil moisture to fruit bud formation in apples. By E. S. Degman, J. R. Furr, and J. R. Magness. Amer. Soc. Hort. Sci. Proc. 29 : 199-201.
- Effects of leaf area, nitrate of soda, and soil moisture on fruit bud formation in the Delicious apple. By C. P. Harley, M. P. Masure, and J. R. Magness. Amer. Soc. Hort. Sci. Proc. 29 : 193-198.
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REPORT OF THE ACTING CHIEF OF THE BUREAU OF PLANT QUARANTINE, 1934

UNITED STATES DEPARTMENT OF AGRICULTURE,
BUREAU OF PLANT QUARANTINE,
Washington, D. C., August 28, 1934.

SIR: I transmit herewith a report of the work of the Bureau of Plant Quarantine for the fiscal year ended June 30, 1934.

Respectfully,

AVERY S. HOYT, *Acting Chief.*

HON. HENRY A. WALLACE,
Secretary of Agriculture.

INTRODUCTION

Work of the past year has been notable primarily for progress in the suppression or eradication of known outbreaks rather than in the finding of new or startling developments. The discovery of a considerable infestation of the Japanese beetle in St. Louis constitutes the only major finding of a well-known serious pest in a new section of the country.

The eradication of the Pennsylvania outbreak of the gypsy moth was stimulated and intensified as a result of the allotment of funds from the Public Works Administration and other emergency organizations of the Government. This infestation has proved to be large and thoroughly established, and almost half of the egg clusters destroyed in the Department's gypsy moth campaign during the year were found in that State. Similar allotments of emergency funds also made it possible to extend the suppressive activities in western New England eastward from the barrier zone into the Connecticut River Valley to aid in the elimination of infestations in that region which were threatening to spread westward to localities outside the present known infested sections.

Because of the overlapping of the areas infested by Japanese beetle and gypsy moth, it was found advisable in the interests of economy to merge the enforcement work on the two quarantines. With the spread of the Japanese beetle in the New England States and the extension of the quarantine in that area, the Bureau was in the position of having two sets of inspectors in the same area while the work of inspection and certification of products could be handled by one unit. The enforcement of the satin moth quarantine which is operative in the same territory was also combined with the other two quarantines.

Progress is reported in connection with the pink bollworm outbreak on wild cotton in southern Florida. A new infestation consisting of the finding of two infested fields in Georgia necessitated some additions to the regulated area but is not believed to threaten the success of the eradication effort in that part of the United States. Through the cooperation of the Agricultural Adjustment Administration it was possible to establish a cotton-free zone surrounding the infested premises for 1 year and this additional safeguard, it is believed, will constitute an important aid in the extermination of the pink bollworm from the southeastern part of the United States.

Among the new and improved methods described in this report may be mentioned the use of glass flytraps for determining the status of citrus groves as to Mexican fruit fly infestation in the lower Rio Grande Valley, and a number of improvements in methods of treating cotton for the pink bollworm, and in spraying equipment used in the gypsy moth project.

The work of the port-inspection service, which is maintained for the protection of the agriculture and horticulture of the United States from injurious foreign insects and plant diseases, resulted in 25,305 interceptions of insects and plant diseases. Those which it was possible to determine definitely were found to belong to 1,277 different species of insects, 166 different species of fungi and bacteria, and 14 species of nematodes. In making these interceptions, the

inspectors checked on all the shipments of plants and plant products entered through the customs service from outside the United States and went over the ships' stores and passengers' baggage of the ships and airplanes arriving from foreign countries.

DOMESTIC PLANT QUARANTINES

GYPSY MOTH AND BROWN-TAIL MOTH CONTROL

CONDITION OF THE INFESTED AREA IN NEW ENGLAND

During the summer of 1933, defoliation caused by the gypsy moth (*Porthetria dispar* L.) to forest, shade, and fruit trees was considerably in excess of that recorded the previous year. Slight to complete defoliation was found on 397,730 acres, as compared with defoliation on 286,395 acres recorded for the summer of 1932. In the eastern part of the infested area defoliation was not much more severe than that recorded the previous year, but areas of defoliation were found much farther west in Worcester County, Mass., than have been recorded previously, and some defoliation was noted near the Connecticut River in Massachusetts; also one small area west of the river in Massachusetts and another in Vermont. In Connecticut the largest defoliated area ever found in the State was discovered near New London. Losses to tree growth due to defoliation were severe, although exact records are difficult to obtain. In the southeastern part of Massachusetts serious loss was caused to cranberry bogs, the owners estimating a crop reduction of 16,888 barrels. On the basis of prices obtained for the crop, this loss amounted to \$151,992. Reports received through June 1934 indicate that there are many large defoliated areas throughout the State as far west as the Connecticut River and that in the section immediately east of the river more serious defoliation is likely to result than at any time in the past. This indicates that if the work west of the river had been long delayed the results would have been disastrous to the barrier zone.

The winter of 1933-34 was the most severe winter experienced in the New England States for many years. Temperatures were very low, and many gypsy moth egg clusters were killed in some localities. Killing was not so extensive as has been recorded in some severe winters in the past, and an abnormal fall of snow protected large numbers of egg clusters that were deposited close to the ground, so that in many infestations sufficient hatching resulted to cause heavy defoliation. In a considerable portion of the territory west of the Connecticut River in Connecticut the mortality due to excessive cold was not severe.

SUPPRESSIVE WORK

Gypsy moth control activities for the year were directed along three main lines: (1) Searching for and bringing under control the scattered infestations in western New England, both in the barrier zone and between that zone and the Connecticut River, (2) eradication activities in the outlying infestations of Pennsylvania and New Jersey, and (3) controlling the interstate shipments of materials which might carry infestation to other parts of the United States.

The work done west of the Connecticut River in New England and in New York and Pennsylvania, including that done by Civilian Conservation Corps camps east of the barrier zone, is summarized in table 1.

TABLE 1.—Summary of work accomplished in gypsy moth control, fiscal year 1934¹

State	Woodland scouted	Roadsides scouted	Trees ex- amined in open country	Egg clusters destroyed
	<i>Acres</i>	<i>Miles</i>	<i>Number</i>	<i>Number</i>
New York.....	55,919	420	147,663	0
Vermont.....	935,437	3,238	819,025	147,925
Massachusetts.....	422,584	388	173,199	384,507
Connecticut.....	423,775	3,142	1,639,144	21,334
Pennsylvania.....	54,475	2,444	1,326,587	478,826
Total.....	1,892,190	9,632	4,105,618	1,032,592

¹ In addition to the work listed above, 2,597 acres of woodland were cleared of worthless trees and brush; nearly 70 miles of barbed wire were erected for temporary use around areas selected for spraying; 109,663 burlap bands were applied to trees; 268,364 gypsy moth larvae and pupae were crushed under these bands; 11,537 acres of woodland, 8,272 isolated trees, and 2,763 properties in residential sections were sprayed with arsenate of lead.

WORK IN NEW ENGLAND AND NEW YORK

In New York five towns in Clinton County adjoining Lake Champlain were scouted, and no gypsy moth infestation was found. This completed the scouting of a group of towns approximately one tier in width extending from the Canadian border to and including Putnam and Hague, N. Y. Towns other than the five indicated in Clinton County had been examined in previous years by this Bureau and by gypsy moth experts employed by the Conservation Department of the State of New York.

Cooperation with the State department of agriculture and the State department of conservation in enforcing the State gypsy moth quarantine on Long Island was continued throughout the year. A total of 2,939 shipments of nursery stock, lumber, and other materials which might carry infestation were inspected and certified before being shipped out of the area. The conservation department in carrying through the scouting and clean-up work on Long Island, located 14 infestations totaling 128 egg clusters in North Hempstead and 25 infestations totaling 386 egg clusters in Oyster Bay Town. These infestations were all sprayed during June, and the Bureau cooperated to the extent of lending three spraying machines and the necessary equipment to carry on the work. Territory in the eastern part of Long Island has been scouted during the year by men from Civilian Conservation Corps camps, supervised by regular employees of the conservation department, but no additional infestations have been found. One small infestation in the New York section of the barrier zone was located in the town of Northeast and was thoroughly treated and sprayed.

For many years it has been realized that infestations between the Connecticut River and the barrier zone were a distinct menace in keeping the zone free from gypsy moth infestation. For the past 2 years evidence was reasonably conclusive that reinfestation of cleaned-up territory in the zone was due to the spread of small larvae from the infested area to the eastward by wind. A large share of the work in western New England was accordingly devoted this year to the destruction of egg clusters east of the barrier zone.

In Vermont the first scouting was done in towns located on both sides of the barrier-zone line from the Canadian border as far south as Hancock and Goshen. This territory covers the summit of the Green Mountain Range. Wooded elevations ranging from 3,000 to over 4,000 feet are common, and the work presented unusual difficulties. Scouting in most of these towns was completed, as was that in many towns between this area and the New York State line. In a number of towns the scouting was not completed on account of unfavorable weather conditions.

In the southern half of the territory in Vermont, where work was to be carried on, the woodland in a number of towns was completely scouted, and the territory along the Connecticut River was given particular attention. It was impossible to complete the scouting in all the towns in this southern section, for the most part because of the reduction of funds, necessitating a change in plan. With the exception of towns bordering the Connecticut River, only one gypsy moth infestation was found in the territory scouted in Vermont. This was in the town of Shoreham, where remnants of egg clusters were discovered on a sled that had been purchased by a farmer and brought there from eastern Massachusetts. In the southern part of the territory along the Connecticut River heavy infestation was found, as is indicated in table 1. The creosoting of egg clusters was carried on both by the regular force and by men from a C. C. C. camp near Bellows Falls, and five spraying machines were operated in the worst infestations throughout June. Scouting work was done in 98 towns in Vermont; from slight to very heavy infestations were found and treated in 17 towns.

In Massachusetts the scouting indicated that many of the towns were more generally infested than had previously been suspected, and some infestation was found in all towns except a few in the western part of the area nearest the barrier zone. Special arrangements were made in carrying on the work east of the zone in Massachusetts because each town has a local organization that is doing gypsy moth work. The funds appropriated by the towns are seldom adequate to do the work that is absolutely necessary in the villages and orchards and on the street trees and to make examinations of the woodland areas. Accordingly, an agreement was made between the local authorities, the State department of conservation (which has general supervision over gypsy moth work in Massachusetts), and the Bureau of Plant Quarantine so that the Federal and local work could be coordinated to eliminate friction or duplication of effort. The results have been satisfactory, and table 1 indicates the acreages covered and the

treatment that has been applied. Twenty spraying machines were used throughout the season in the worst infested and most dangerous places. This entire Massachusetts area embraces some 1,067 square miles with much semimountainous country and included many locations where egg clusters that had been treated with creosote might have been sprayed to advantage had additional equipment been available and had it been possible to carry through an extermination plan. The results show very clearly that there were infestations sufficiently heavy to have caused defoliation this summer and opportunity for spread of the insect into the barrier zone next spring if treatment had not been applied. Up to this time only one large defoliated area has been found west of the Connecticut River, and that is located within a few miles of the river. Scouting work was done in 49 towns, and 36 were found to be infested. Some heavily infested areas were discovered within a few miles of the barrier zone.

In Connecticut west of the Connecticut River conditions are not quite so serious as in Massachusetts. For a number of years the gypsy moth force, working under the direction of the State entomologist, has concentrated much effort in carrying on scouting and clean-up work in the towns west of the river, particularly those near the barrier zone. As a result of this, smaller infestations were found in Connecticut; and in a considerable number of towns near the border of the zone and in the territory near Long Island Sound no infestation was discovered by the scouting force. Nineteen spraying machines were used in the State during June, and all colonies that were found during the year were either creosoted or thoroughly sprayed, or both. Scouting work was done in 70 towns, and 34 towns were found to be infested. There is in the southern part of the barrier zone in Connecticut a rather large group of towns where the woodland has never been scouted, and this area, as well as the area in Vermont that could not be completed, should have early attention, there being a possibility that infestations of which we have no knowledge may be building up.

During the winter civil works funds were made available for the States of Massachusetts and Connecticut to carry on gypsy moth scouting and treatment in territory east of the Connecticut River. This resulted in the treatment of large numbers of gypsy moth egg clusters and the discovery of large colonies in woodland areas the presence of which was not known heretofore. This work was of great value, as it indicated the need for more detailed inspection and treatment, particularly in the area in these States where the gypsy moth was known to exist in only a relatively small number of localities. The value of this work is emphasized by the fact that there now exist in the territory east of the Connecticut River more extensive defoliated areas than have ever been observed heretofore. The need for more work along this line is evident.

Emergency conservation work on the gypsy moth was carried on from 18 camps in towns between the barrier zone and the Connecticut River—1 in Vermont, 10 in Massachusetts, and 7 in Connecticut. Originally these camps were all under the control of the Forest Service, but during the year 5 of those in Massachusetts were transferred to the supervision of the Department of the Interior. Scouting and the treating of egg clusters were carried on by these men under the supervision of foremen experienced in gypsy moth work and contributed very materially to the results that have been obtained during the year on the gypsy moth problem.

PROGRESS IN ERADICATING NEW JERSEY AND PENNSYLVANIA OUTBREAKS

In New Jersey the small force employed by the State put up and examined assembling cages during the summer and carried on scouting work in the area that seemed most likely to be infested. Three gypsy moth egg clusters were found at the site of the 1933 infestation. This area was sprayed early in June. The spraying machine, equipment, insecticide, and operator were furnished by the Bureau, and the unskilled labor was supplied by the State.

In Pennsylvania a small amount of spraying was done immediately after July 1, 1933, in order to complete the work that had been carried on in June of the preceding fiscal year. Four hundred and forty-eight acres of woodland and four hundred and forty-nine properties in residential sections were sprayed. Burlap bands were applied in especially dangerous areas, and all caterpillars found under them were crushed. Only a small force was carried during July and most of August, but by September 7 the force was expanding rapidly as a result of obtaining emergency funds from the Public Works Administration. This force was built up to 470 men and was maintained rather constantly until about the first of March, 1934, when a reduction in personnel became necessary. About the middle of May the force was increased for the spraying season.

In September, after the force had been assembled and trained, work was taken up along the Susquehanna and Lackawanna Rivers in order that any infestation that existed might be treated to prevent the movement of egg clusters on driftwood during high water. The Susquehanna River banks were scouted from the Newport Township line north to the Falls Township line, a distance of approximately 25 miles, and the banks of the Lackawanna were scouted a distance of 7 miles from its mouth northeastward. Only 5 small infestations were found as a result of this work, 3 in Pittston Township and 2 in the boroughs of Old Forge and Taylor. Prior to this time 1,823 assembling cages were put up in 54 towns surrounding the badly infested area and were patrolled by the field men. Sixty-one moths were taken from 31 of these cages.

An effort was made in Pennsylvania to scout and treat the area known to be most heavily infested and to determine as far as possible the outlying infestations by scouting the roadsides, orchards, and trees along the woodland borders. This resulted in finding infestations in territory that had not been examined the previous year, and on March 1 the Pennsylvania State quarantine was extended to cover the area of 700 square miles known to be infested at that time. Since that date, scouting has been continued in the territory surrounding the infested area, particularly toward the north, east, and south, and several small isolated infestations have been located. This brings the acreage of territory that should be placed under quarantine up to 880 square miles. The scouting disclosed no outlying colonies beyond the generally infested area, and this indicates that the problem in Pennsylvania consists of the difficult task of wiping out the infestation in the large area described above. The work accomplished is listed in table 1. Twenty-one spraying machines were operated in this territory during the summer. Over 2,700 residential properties were treated, but most of the work was done in woodlands where long lines of hose and irregular terrain made progress slow and difficult.

In the enforcement of the State quarantine, which was handled cooperatively with this office, 1,999 shipments were inspected and certified. Most of this material consisted of mine props and lagging, but nursery stock, and a miscellaneous assortment of forest products, cable reels, etc., were also inspected before movement was permitted.

On August 16, 1933, an allotment of \$2,020,620 was made by the Public Works Administration to the Bureau for the purpose of carrying on the control and extermination work in Pennsylvania, in the barrier zone in New England and New York, and in the strip of territory between the barrier zone and the Connecticut River in Connecticut, Massachusetts, and Vermont. After this allotment had been made the funds carried in the regular appropriation for scouting and extermination were withdrawn and the gypsy moth force, with the exception of the quarantine section, was transferred to work under this allotment. The work was organized rapidly and men began reporting the first week in September. More than 2,000 men were employed through the offices of the national reemployment service in the States where the work was to be done. The force decreased somewhat during the winter, and in March and early April 1934 drastic reduction in personnel was necessary in order that \$459,282 of the funds available could be carried over for use after July 1. The number of employees was decreased to approximately 450, but by the 1st of June it was necessary to employ additional men to take care of spraying, and the rolls for that month averaged 1,200 men.

On June 30 the emergency work was discontinued and all temporary employees dropped, with the exception of a small force needed to care for and repair equipment and compile and complete the records of the project.

Through a provision in the agricultural appropriation bill, \$360,000 was made available to carry on the regular work of this project for the fiscal year 1935.

In order to carry through the gypsy moth project on the increased funds available during the year, additional supplies of insecticides, tools, and other equipment were purchased. One hundred and sixty-five tons of arsenate of lead and 10,500 gallons of fish oil were purchased for the spraying work in the New England territory, and 80 tons of arsenate of lead and 3,500 gallons of fish oil were purchased for the Pennsylvania area. Most of the supplies in Pennsylvania were procured by the State. It was also necessary to remodel most of the spraying equipment so that constant spraying could be maintained to prevent delay in filling the tanks, and 10 additional high-power spraying machines, mounted on light automobile chassis, were obtained.

The funds allotted for this work, amounting to \$2,020,620, were reduced by \$459,282 as previously stated, so that \$1,561,338 was available for the fiscal year 1934. It is estimated that not less than 80 percent of the work originally planned for the full amount of funds has been completed, and in the New England area the largest and most threatening colonies, particularly those in the woodland, were treated before the end of the fiscal year. These results were accomplished in spite of the fact that during the winter weather conditions were abnormally severe. In many sections of New England where the work was carried on, record-breaking subzero temperatures continued for extended periods, and the snowfall was above normal. Progress could not have been made in many of these areas without equipping the men with snowshoes and, although 1,200 pairs were in use, serious consideration was given at one period during the winter to discontinuing the work until there were better conditions for traveling. All woodland scouting in New England was done on the 40-foot strip method, while in Pennsylvania the woodlands that were covered were given a more intensive inspection.

The opportunity afforded by the allotment of emergency funds to do much-needed constructive work on the gypsy moth project has made it possible to determine with reasonable accuracy the menace that exists in the territory adjoining the barrier zone. The treatment that has been applied to the infestations found will give temporary relief, but cannot be expected to afford continuous protection to the zone unless control work is carried on annually in a systematic way. The work in Clinton County, N.Y., makes it possible for the Department to consider the elimination and release from the barrier zone of the territory in northern New York west of the Vermont State line as far south and including the towns of Putnam and Hague, an area embracing 1,056 square miles. Certain territory in Vermont may in addition be released from the regulated area on the basis of the scouting in that State. In Pennsylvania treatment of the known infested area has prevented defoliation this year and has resulted in the discovery and treatment of outlying infestations. The quarantined area in that State can now be extended so that material passing from all the infested territory can be inspected in order to protect the uninfested parts of Pennsylvania and other States.

THE BROWN-TAIL MOTH

Observations made in the summer of 1933 showed that 20 towns in Maine, outside the quarantine line, were infested with the brown-tail moth (*Nygmia phaeorrhoea* Don.); 18 towns in New Hampshire outside of the line showed infestation, and 5 towns in Vermont were infested. Much of the southern half of New Hampshire and extensive areas in southern and eastern Maine were heavily infested, and the trees were severely defoliated. Late in the fall hibernating webs were extremely abundant in the above-mentioned sections of the two States. In Massachusetts most sections of the quarantined area were lightly infested, but here and there towns were found with spots of heavier infestation and some defoliation.

On December 1, 1933, the Civil Works Administration approved an expenditure of \$870,850 for a brown-tail moth extermination project, to be carried on as a Federal project in the States of Maine, New Hampshire, Vermont, and Massachusetts, under the supervision of the Bureau of Plant Quarantine. This extermination project was one on which large numbers of men could be given useful employment in cutting and burning the hibernation webs present in abundance on the trees in many sections of the infested area.

The work was organized very rapidly, and eventually more than 4,500 people were employed. The project was discontinued on February 15, 1934, although the work had not been completed in any of the States. Approximately \$515,000 was expended on this project, and the plan could have been completed if an extension of time had been allowed. More than 95 percent of the funds used were expended for personal service.

Webs were cut in towns inside the quarantined area in Maine, New Hampshire, and Massachusetts; also in a few towns outside of the quarantined area in New Hampshire and Massachusetts. As the quarantined area did not extend as far west as Vermont, all towns in that State in which work was done were outside of the quarantined area.

As the work progressed very heavy infestations were found in many towns in southern Maine and New Hampshire. In these two States there were a number of towns containing from 200,000 to 300,000 webs, and there were also many towns from which over 100,000 webs were cut. In Massachusetts the towns were not so heavily infested as in Maine and New Hampshire, but some towns yielded

from 40,000 to 50,000 webs. In the Vermont towns in which work was performed, infestation was generally light and scattered, but there were spots of slightly heavier infestation.

During the progress of the work webs were cut in 221 towns in Maine; in 140 in New Hampshire; in 227 in Massachusetts; and in 20 in Vermont. In these towns in Maine 9,857,689 webs were destroyed; in those in New Hampshire 9,766,970; in those in Massachusetts 328,310; and in those in Vermont 1,280. This makes a total of 19,954,249 webs destroyed in these four States. After the termination of the Federal project in New Hampshire arrangements were made for future work by State officials, and approximately 3,900,000 additional webs were cut and destroyed.

COOPERATION

Cordial relations have continued between the Federal gypsy moth staff and the various State and other agencies cooperating. The results accomplished during the fiscal year 1934 have been due in a large measure to the excellent support and interest displayed by all agencies with which this project has cooperated.

THE SATIN MOTH

There was no appreciable spread of the satin moth (*Stilpnotia salicis* L.) in the New England States beyond the territory that was found infested in 1933. The only extension of infested territory of consequence was at the extreme northeastern point of the infested area in Maine, where 6 additional towns were found infested—5 being in Aroostook County and 1 in Penobscot County. One additional town was found infested in Franklin County, Maine, and 1 in Grafton County, N. H. Within the infested area severe defoliation was recorded at Bangor and Brewer, Maine; at Alton, Ashland, Campton, Center Harbor, Freedom, and Laconia, N. H.; and at Yarmouth, Mass. Elsewhere in the infested area the defoliation was not severe, although feeding was noticeable in many towns.

GYPSY MOTH AND BROWN-TAIL MOTH QUARANTINE ENFORCEMENT

CONSOLIDATION OF ENFORCEMENT PROJECTS

Quarantine-enforcement work on the gypsy moth and the brown-tail moth was merged with the Japanese beetle quarantine project on January 1, 1934. This transfer was made for the purpose of combining in a single unit the moth and Japanese beetle quarantine-enforcement activities, both of which involve inspection and certification of nursery products in overlapping areas. Although there existed a cooperative arrangement between the two inspection corps prior to the merger, it was not possible to assign all quarantine activities in a district to a single inspector of either project. As Japanese beetle infestation spreads in the New England States, inspection work of the two projects increasingly will overlap. A merger of the projects was therefore in the interests of economy and unified field supervision. With a few exceptions, the former gypsy moth enforcement personnel was transferred to the combined units. Field supervision of the consolidated projects was assigned to L. H. Worthley. Coordination of the nursery-inspection activities peculiar to both quarantines had largely been effected by the end of the fiscal year. The enforcement of the satin moth quarantine was also included in the merger.

CERTIFICATION OF QUARANTINED PRODUCTS

Under a revised procedure effected late in March, nurseries and quarries in uninfested sections of the lightly infested territory are given a preferred status. In lieu of individual inspection of quarantined products, an examination of the entire locality and all supplemental material brought onto the premises is accepted as a basis for the issuance of certificates or permits covering the movement of products from the establishment. This has eliminated much routine formerly attending the issuance of quantities of certificates at a number of large Connecticut nurseries and the numerous quarries in the Barre and Rutland, Vt., districts.

Aggregate totals of quarantined products certified during the 12-month period closely approximated the totals of commodities shipped under certification during the preceding fiscal year.

Summarized in tables 2 to 4 are the quantities of articles of the respective quarantined products certified during the period covered by this report.

TABLE 2.—*Evergreen products certified under gypsy moth quarantine, fiscal year 1934*

Material	Bags	Bales	Boxes	Bundles	Carloads	Packages	Trees	Truck loads	Products found infested	Gypsy-moth egg clusters found
Balsam twigs.....	53	6	1	1	0	87	0	0	0	0
Boughs.....	0	13,328	0	0	42	0	0	0	0	0
Christmas trees.....	0	0	0	0	459	0	103,438	0	0	0
Laurel.....	503	4,866	1,098	1,052	0	43	0	0	0	0
Mixed greens.....	30	272	4,938	125	0	1,819	0	2	0	0
Miscellaneous.....	3	102	332	308	0	45	0	0	0	0
Total.....	589	18,574	6,369	1,486	501	1,994	103,438	2	0	0

TABLE 3.—*Forest products certified under gypsy moth quarantine, fiscal year 1934*

Material	Bags	Barge loads	Boxes	Bundles	Carloads	Cases	Cords	Lots	Pieces	Truck loads	Products found infested	Gypsy moths found		
												Egg clusters	Larvae and pupae	
Barrel parts.....	0	0	0	294	4	0	0	0	0	1	-----	0	0	0
Crates and cratings.....	0	0	0	0	0	0	0	0	115	2	-----	0	0	0
Fuel wood.....	1	0	2	7	40	5	160	0	30	956	-----	0	0	0
Logs.....	0	0	0	0	66	1	0	0	723	1,436	1 truck.....	1	0	0
											1 car.....	2	0	0
											2 trucks.....	5	0	0
Lumber.....	0	1	0	9	638	6	0	183	162	500	1 barge.....	185	0	0
											1 piece.....	2	0	0
											13 cars.....	49	0	0
											1 lot.....	2	0	0
											3 barges.....	34	0	0
Piles and poles.....	0	4	0	1	33	0	0	0	2,990	39	1 car.....	8	0	0
											1 truck.....	6	0	0
Posts.....	0	0	0	0	1	0	0	0	1,459	15	-----	0	0	0
Pulpwood.....	0	0	0	0	1,112	0	337	0	0	353	2 cars.....	1	2	0
Reels.....	0	0	0	1	50	0	0	0	5,815	2	2 lots.....	2	1	0
Shavings.....	0	0	0	0	45	0	0	0	0	0	2 cars.....	24	1	0
Shrub and vine cuttings.....	0	0	122	211	0	15	0	0	0	0	-----	0	0	0
Ties.....	0	0	0	17	407	0	0	0	235	3	3 cars.....	0	7	0
Miscellaneous.....	29	0	53	4,471	370	26	23	6	18,250	65	10 bundles.....	10	9	0
Total.....	30	5	177	5,011	2,766	53	520	189	29,779	3,372	(¹)	331	20	0

¹ Infested total: 4 trucks, 22 cars, 4 barges, 1 piece, 3 lots, and 10 bundles.TABLE 4.—*Stone and quarry products certified under gypsy moth quarantine, fiscal year 1934*

Material	Barge loads	Barrels	Boxes	Carloads	Crates	Pieces	Truck loads	Products found infested	Gypsy moths found	
									Egg clusters	Larvae and pupae
Crushed rock.....	0	0	2	1,322	0	0	5	-----	0	0
Curbing.....	0	0	0	47	0	10	0	2 cars.....	0	80
Feldspar.....	0	0	5	74	0	0	0	1 car.....	1	0
Granite.....	28	0	92	1,857	425	84,115	546	26 cars.....	185	0
								3 pieces.....	2	1
Grout.....	42	0	0	139	0	49	0	1 car.....	0	1
Marble.....	0	0	10,168	611	22,117	3,382	4	-----	0	0
Paving.....	2	0	0	676	0	0	0	9 cars.....	6	26
Miscellaneous.....	0	11	347	18	26	121	63	1 car.....	2	0
Total.....	72	11	10,614	4,744	22,568	87,677	618	40 cars..... 3 pieces.....	196	108

¹This does not include 48 egg clusters found on cleating and blocking used to secure granite on cars. In addition, 17 adult brown-tail moths were found on a carload of granite.

Snow, high winds, subzero temperatures, and impassable roads were responsible for a decrease in the quantity of material inspected throughout the regulated areas during February and March. Nursery shipments were completely suspended, and all activities in wood lots and quarries were either discontinued or greatly curtailed until the weather moderated in April.

Nursery stock certified for movement from the regulated areas totaled 80 carloads, 1,683 truck loads, and 27,700 individual containers. In the course of the inspection of this stock, 9 gypsy moth egg clusters and 5 larvae were removed from 3 carloads, 2 truck loads, and 4 individual shipments.

Permits were issued for the movement of 3,467 individual or bulk lots of quarantined products brought into the regulated areas for reshipment to noninfested territory. Two hundred and sixty-three firms or individuals dealing in products manufactured, processed, or stored in a manner to eliminate all possible infestation, shipped under permit during the fiscal year 30,939 bulk or individual lots of restricted materials.

All the spare time of inspectors not occupied in actual inspection and certification was utilized in infestation surveys in the vicinity of nurseries and tourist camps in their respective districts. Inspections were made of 443 camps. Gypsy moth infestations were observed in 137 of these camps, and winter webs of the brown-tail moth were found in 41 camps. The necessity for the destruction of the infestation was called to the attention of the manager of each infested property.

SCOUTING IN LIGHTLY INFESTED AREA

Late in May, six temporary inspectors made a rough field survey of towns in the lightly infested area of Maine adjacent to the generally infested section of the State. An average of 12 hours' scouting was performed in each of 46 towns. Large numbers of egg clusters were noted in a strip of territory approximately three towns wide, north of the generally infested zone of Maine.

ROAD PATROL

Road-patrol operation on the principal exit highways leading from the lightly infested area of Connecticut began on April 14. Permanent stations on the Boston Post Road and the principal entrance highway to New Haven from Hartford and Meriden, were supplemented by two mobile patrols covering a total of 8 less-frequented highways. These line stations were discontinued on May 26. The principal westbound-exit highways were thus guarded during the peak of the 1934 spring nursery-shipping season. While the road-inspection work was in progress, inspections were made of 13,992 vehicles, 1,341 of which were found to be transporting uncertified quarantined products.

VIOLATIONS

Through personal visits by district inspectors or correspondence with the consignors and agents of the common carriers involved, investigations were made of 230 apparent violations of the gypsy moth and brown-tail moth quarantine intercepted by transit inspectors of the Department. A few of the violations occurred through unintentional carelessness on the part of a commercial shipper. Approximately two-thirds of the uncertified shipments were made by private individuals who were uninformed of the requirements for certification. In the absence of evidence of deliberate attempts to evade the inspection requirements, no legal action was instituted in any of the cases investigated.

JAPANESE BEETLE QUARANTINE AND CONTROL

CONDITIONS OF INFESTATION

Marked deficiencies in rainfall during June and July 1932, contributed to notable reductions in the 1933 populations of adult Japanese beetles (*Popillia japonica* Newm.) in some heavily infested sections. Similar unfavorable climatic conditions were factors in the disappearance of many small isolated infestations determined in 1932, and in the reduced numbers in which adults reappeared in other scattered infestations.

In the formerly heavily infested section of Philadelphia the reduction in beetle population was pronounced. Reduced infestation from the swarm conditions of former years was also apparent in various sections of the continuously infested territory in east-central New Jersey. Intense foliage damage was found in a large part of southern New Jersey, in a localized east-and-west band across the

State north of Trenton, in the Philadelphia suburban sections, and throughout the extreme northern river-front section of Delaware. Lack of rainfall during those months of 1932 when oviposition was taking place and the larvae for the 1933 beetle population were hatching was largely responsible for the moderated flight. A number of 1932 first-record infestations at which only a few beetles had been collected did not recur. Climatic factors were probably responsible for these reductions, as well as for those in the densely infested zone. In Cleveland, Ohio, where a 1932 infestation of nine beetles failed to reappear in 1933, there had been notable deficiency in rainfall during July 1932. In Virginia, the disappearance of 4 small, isolated infestations and distinct decreases in 4 others corresponded with unusually dry weather in the State during June and July 1932. In Portland, Maine, however, where 11 beetles were captured in 1932 and 52 in 1933, there was an excess of precipitation during July and August 1932, when the grubs were hatching. The survival of the infestation in Portland and the collection of 139 beetles at an apparently established infestation at Waterville, in the same State, indicate that the insect is capable of overwintering in latitudes of this country where the winters are severe and the growing seasons short.

Surveys in nonquarantined States showed no wide-spread dissemination of the insect during 1933. Traps operated in the summer of 1933 totaled 52,000. These were distributed in 451 nonregulated communities. Traps were already in operation at the beginning of the fiscal year at 52 points in South Carolina, 61 localities in North Carolina, 26 towns and cities in West Virginia, and 134 points in Virginia. As the season of probable beetle emergence occurred in the respective States, traps were set at 30 locations in Ohio, 11 cities in Michigan, and 15 cities in Maine. In nonregulated portions of States already partially infested, traps were maintained in 64 communities in Maryland, 9 Pennsylvania cities, 32 New York locations, 10 Vermont cities, and 7 New Hampshire localities. In small communities as few as 10 traps were placed, while from 396 to 814 traps were scattered throughout sizable cities. In larger cities traps were usually operated for a period of 60 days. In smaller communities traps were lifted at the end of 30 days, unless beetles were still being caught. The removal of the late-operated traps in the New England States was completed by the middle of October. The season's captures totaled 724 beetles, trapped in 87 communities. Infestations had been found during 1932 in 28 of these communities.

Only two important first-record infestations that appear to be established were discovered in 1933. A large number of small infestations were disclosed that were possibly of stray beetles carried to the isolated points during the current year. The ability of traps to disclose the presence of even a stray specimen has been clearly demonstrated. Positive trap catches were made in Augusta, Biddeford, Portland, and Waterville, Maine; 25 communities in Maryland; Detroit, Mich.; Woodsville, N. H.; 13 New York cities and towns; 15 localities in North Carolina; Canton, Columbus, Washington Court House, and Youngstown, Ohio; Erie and Warren, Pa.; Florence and Greenville, S. C.; Burlington, Vt.; 15 Virginia towns and cities; and Clarksburg, Fairmont, Keyser, and Princeton, W. Va. Of these 87 new or recurring isolated infestations, 75 yielded fewer than 9 beetles each. At 40 of them it was possible to trap only a single beetle each. From 2 to 8 beetles were caught at each of 35 additional infestations. The only points in nonregulated territory at which 10 or more beetles were trapped during 1933 were Erie, Pa.; Waterville and Portland, Maine; Salamanca, N. Y.; Keyser, W. Va.; and Berwyn, Bethesda, Bladensburg, Chevy Chase, Hyattsville, Riverdale, and Silver Spring, Md. The trap catches ranged from 10 beetles in Berwyn, Md., to 167 beetles in Erie, Pa.

Of the 59 first-record finds in nonregulated sections, only 2, those at Waterville, Maine, and Keyser, W. Va., represent unquestionably established infestations. These two infestations were also the only new ones found at any considerable distance from the zone of continuous infestation. All other newly found infestations consisted of from 1 to 12 beetles each. Ten of these fifty-nine localities had been trapped, with negative results, in 1932. First-record infestations yielding the most beetles were Waterville, Maine, 139; Keyser, W. Va., 25; Bladensburg, Md., 35; Hyattsville, Md., 31; Riverdale, Md., 24; Silver Spring, Md., 18; and Berwyn, Md., 10.

Comparative results of this season's trapping activities in 45 infested towns and cities located outside the 1933 regulated zones show that 9 of these infestations, ranging from 1 to 11 beetles each in 1932, showed negligible increases in 1933 to a range of from 3 to 52 specimens. The largest comparative increase was from 11 to 52 beetles in Portland, Maine. An additional 19 isolated infestations found in 1932 showed an equal or reduced carry-over in 1933. Exclusive of Erie,

Pa., these 19 infestations ranged from 1 to 24 beetles in 1932. In 1933, none of them yielded more than 12 beetles. In the city of Erie the number of beetles decreased from 282 in 1932 to 167 in 1933. Negative results in 1933 trapping activities showed that 15 isolated infestations found in 1932 in Maine, Maryland, New York, Ohio, Virginia, and West Virginia, ranging from 1 to 11 beetles each, failed to persist.

It was possible to carry on such an extensive trapping campaign this year only through the use of welfare labor supplied by State and county relief organizations. Practically all trap inspectors employed in West Virginia, Pennsylvania, Ohio, Michigan, New York, New Hampshire, and Vermont were men paid from unemployment-relief funds. Many of these were part-time workers. At the end of August 180 men furnished by emergency-relief boards were employed on various phases of quarantine and control activities. Their employment permitted the utilization of the Bureau's entire trap supply and made possible trap survey work in sections where otherwise these activities would have been abandoned because of insufficient funds. Trap inspectors and foremen in Maine were paid from State funds. Throughout the winter the entire supply of traps was completely renovated, repainted with aluminum paint, and packed in specially constructed wooden boxes for distribution. Comparative tests have disclosed little difference in the catches in traps painted with the standard green-and-white combination and those painted with aluminum. The aluminum protective coating was applied in the interests of economy and durability. The reconditioning of Japanese beetle traps was a Civil Works Administration project which employed 10 men.

Arrangements were made for the construction by a Pennsylvania manufacturer of 500 Japanese beetle traps for the Canadian Department of Agriculture. Since trapping activities in 1932 disclosed a small infestation in Niagara Falls, N. Y., it is the intention of the Canadian authorities to distribute these traps in 1934 on the Niagara Peninsula. In view of the proximity of the insect to the Canadian border, the Dominion Entomological Branch desires to take precautionary measures to forestall the establishment of the insect in Canada.

Despite subzero weather early in February throughout most of the regulated territory, soil temperatures in the zone did not drop below 27° F., whereas ground temperatures of from 10° to 20° are required to freeze large numbers of grubs. The frigid temperatures therefore had no appreciable effect on the grub population.

Trapping activities under way at the end of the fiscal year included traps set in 38 Virginia localities, 2 cities in West Virginia, and 44 Maryland communities, in addition to 800 traps distributed in St. Louis, Mo.

Early in 1934, through the State plant officer of Missouri, a report was received that specimens of the Japanese beetle had been collected in St. Louis by amateur entomologists in both 1932 and 1933. The collection of the insect in the southern section of St. Louis in the summer of 1932 first came to the attention of the State plant officer in March 1933. A few additional specimens were collected in the same locality in June 1933. Subsequent to the latter find, a State inspector applied a small quantity of lead arsenate to the yard in which the beetles had been taken. Information concerning the 2 years' recovery of the insect was not conveyed to the Bureau of Plant Quarantine until February 7, 1934. Results of the early season trapping in 1934 in St. Louis indicate that the delay in suppressing this infestation has permitted the insect to establish a scattered infestation over a rather extensive section of the city, approximately 30 blocks southwest of the union station. Traps set in and surrounding the reported center of infestation resulted in the collection between June 22 and June 30, 1934, of 513 beetles in an area comprising 83 contiguous blocks. Many additional beetles were captured in the city as the trapping program continued into the next fiscal year. Inspectors for the St. Louis traps were employed by the Missouri Department of Agriculture. Welfare labor was also supplied by the city of St. Louis to assist in the trap work. There had been no additional first-record infestations determined in nonregulated territory at the end of the fiscal year, except the findings at St. Louis and a small infestation at Upper Marlboro, Md.

RESULTS OF CONTROL WORK IN PREVIOUS YEARS

There was no recurrence in 1933 of the infestation in the sections of Richmond, Va., that were treated with arsenate of lead in the fall of 1931. In 1931, 15 beetles were caught. Last year 88 beetles were trapped, and this year 16 beetles were collected in the city. Although a number of the 1933 findings were made

in the vicinity of the treated blocks, all trapping in the poisoned sections gave negative results.

Sections in which 8 beetles were caught in Detroit, Mich., in 1932 were treated with lead arsenate in September of that year. During 1933, 1,000 traps distributed throughout Detroit caught 4 beetles, none of which were trapped in the treated areas. Three of the specimens were caught in the vicinity of the Michigan Central Railroad. A single beetle was found in a city park approximately 4 miles distant from other findings. Trap activities in Detroit were supplemented by the city's spraying sections in which infestations had previously been found. The spraying operations began on July 25. A total of 535 trees and a large number of shrubs were covered with the spray. A quarter of a ton of coated arsenate of lead was applied to the two sprayed sections of the city.

There was no carry-over from the infestation of two beetles trapped in Florence, S. C., in 1932, and treated in the fall of that year with lead arsenate furnished by the State of South Carolina. Although a single beetle was trapped in 1933 in Florence, it was taken at a considerable distance from the previous year's find.

Excellent control has been obtained at established infestations in Erie, Pa., where intensive eradication measures have been practiced during the past 2 years. During 1931, 170 beetles were collected in 4 adjacent city blocks in the residential section near the city park. In the fall of 1931, 32 acres in and surrounding the infested premises were treated with arsenate of lead at the rate of 500 pounds per acre. This dosage did not give satisfactory control, for in 1932, 270 beetles were trapped in this treated area. Twelve beetles were also caught outside the poisoned section. The 1932 trap work was supplemented by repeated applications of an attractive poisonous spray to all foliage in the infested sections. Following the disappearance of the adult beetle in 1932, additional applications of lead arsenate were made to the original centers of infestation, to other adjacent small infestations, and to two infestations of a few beetles each at some distance from the sections previously treated. The 1932 treatments involved the application of 11.2 tons of soil insecticide to 40.6 acres. Yards that appeared to be centers of infestation were treated at the rate of 750 pounds per acre in addition to the previous application of 500 pounds per acre. The remainder of the treated sections was dosed at the rate of 500 pounds of poison per acre. Three premises and adjacent properties, near the original infestation, on which single beetles were trapped in 1932, received treatment at the rate of 1,000 pounds per acre. This rate was also used in treating an isolated infestation of 5 beetles. Early in July 1933 coated arsenate of lead was sprayed on the foliage in 34 residential blocks in which beetles were trapped in 1932. Small cages from which attractive liquid bait was vaporized were hung in the principal sprayed host plants to attract the beetles and to induce feeding on the poisoned foliage. During the summer of 1933, 1,282 traps were concentrated in Erie, with the result that 167 beetles were caught. Only 10 of these were trapped in sections where the soil had previously been treated with lead arsenate. Only a single beetle was caught in a yard where 151 beetles were trapped in 1932. In the most heavily infested block, the catch was reduced from 200 beetles to 6. Traps in the latter area were baited with both bran and liquid bait to ensure the catch of all beetles present. As new infestations were disclosed, soil treatments with lead arsenate were made at the rate of 1,000 pounds per acre. The 1933 soil treatments covered an area of 55 acres.

REGULATORY CHANGES

Subsequent to a public hearing held on October 24, 1933, for a discussion of the advisability of extending the quarantine to include the States of Maine and West Virginia, parts of these two States were brought under restriction, and boundaries of the regulated zones in Maryland, New York, and Virginia were slightly modified. In Maine the section placed under regulation includes sufficient territory to make a continuous area from the New Hampshire line to and including the city of Portland. Waterville, Maine, was included as a detached regulated zone. Along with the addition to the restricted zone of the town of Keyser, W. Va., sufficient Maryland territory was added to form a continuous strip from the previously regulated zone in the Cumberland, Md., district to the West Virginia line adjacent to Keyser. One West Virginia district south of Cumberland also was added to facilitate quarantine enforcement. In Maryland several sections were added to bring under regulation a number of infestations in localities suburban to the District of Columbia. An additional magisterial district in Henrico County, Va., was added for the purpose of including an infested nursery in that subdivision. The remainder of Norfolk County, Va.,

was placed under regulation. By the inclusion of two towns in Cattaraugus County, N. Y., a small area was added to connect the infested city of Salamanca with the main regulated zone in Pennsylvania.

Except for the extension of the regulated territory, there were few important changes in the twelfth revision of the quarantine regulations effective December 1, 1933. The territory from which quarantined fruits and vegetables may be shipped without certification and to which similar articles may not be moved without certification from the remainder of the regulated territory, was extended to include the isolated areas of Waterville, Maine, and Henrico County, Va. Slight modifications were also effected to exempt certain commodities not subject to infestation and to simplify the certification procedure on lot freight shipments.

CERTIFICATION AND TREATMENT OF NURSERY AND GREENHOUSE STOCK

Nursery and greenhouse scouting, begun in Virginia, Maryland, and Delaware in May 1932, was extended on July 1, 1933, to classified establishments in New Jersey and Pennsylvania. In Connecticut and northern New York, crews started scouting on July 10. Such scouting began in southern New York and on Long Island on July 17. In New Hampshire, Vermont, Massachusetts, and Rhode Island the work was organized from July 19 to 24. The examination of classified premises in Delaware, Maryland, and Virginia was completed shortly after the middle of August. Similar work in Pennsylvania, New Jersey, and the more northern quarantined States was concluded early in September. As a result of the 1933 scouting of 1,978 theretofore uninfested nurseries and greenhouses, infestations were discovered in 133 property units. There are now 2,376 regular shippers who comply with the requirements for maintaining a classified status under the regulations. The premises of 604 of these are infested, and special safeguards are required before shipments from them are allowed. This is a net increase of 117 infested classified establishments for the year.

Establishments added to the classified list as a result of the extension of regulated territory effective December 1, 1933, number 33. Of this total 3 are located in West Virginia, 2 in Virginia, 19 in Maryland, 3 in New York, and 6 in Maine.

With moderate weather conditions prevailing until late in the fall of 1933, nursery stock continued to move under certification until the end of November. Ordinarily it is not possible to dig this material much after the latter part of October. Severe winter weather, with heavy snows and subzero temperatures, caused a virtual suspension of nursery activities during February. Even shipments from greenhouses were not considered safe. In nurseries it was impossible to dig stock from the frozen ground. Until the latter part of March, continued frost in the ground further delayed spring nursery shipping. When the weather at last permitted the ground to thaw and dry enough for lifting stock there was an immediate and heavy demand for the inspection and certification of large quantities of plant material to be moved to nonregulated territory. During the February and March lull in nursery and greenhouse inspection, a number of inspectors assisted in transit-inspection work. These men were stationed in New Haven, Conn., Alexandria, Va., Washington, D. C., New York City, Philadelphia, and Pittsburgh. Replacements of winter-killed stock materially stimulated the 1934 spring nursery trade. Stocks of stored, dormant roses were early exhausted. Volumes of sales increased over 1933, resulting in greater demands for inspection and certification. Although the movement of nursery stock was necessarily delayed early in 1934, the spring shipping season was in some sections prolonged until late in May, an unusually late date for such stock to be moved.

A Japanese beetle shipper's guide, containing a digest of the regulations and a list of all cities and towns within the regulated zones, was again prepared and forwarded during December to the approximately 15,000 shippers and agents of common carriers on the Bureau's mailing list.

Joint-certificate stamps which may be used to certify products under the Japanese beetle and/or gypsy moth quarantines were issued to inspectors early in January.

Carload fumigation of sand and soil has been considerably simplified by the use of an injector constructed by the treating division of the project. By means of this device, the correct dosage of carbon disulphide is quickly drawn into a tube by suction. The injector is then pushed into the soil or sand to the required depth and the liquid discharged.

Analyses of soil samples from 413 nursery plots, 271 coldframes, and 17 heeling-in areas were completed by the Technological Division in May. These 701 treated units are scattered throughout 18 nurseries in New York and Pennsyl-

vania. The nursery area from which the soil samples were collected aggregates 113.6 acres. Of this acreage, 39.6 acres required the addition of approximately 6.5 tons of lead arsenate to bring the concentration up to the required dosage of 1,500 pounds of the poison in the upper 3 inches of surface soil throughout the areas. Totals of 217 nursery plots, 227 frames, and 6 heeling-in plots were found to contain lead arsenate equaling or exceeding the required amount. The renewal of the lead arsenate concentration in all nursery plots containing growing plants was accomplished by the end of the fiscal year. On May 31 all chemical apparatus and reagents were transferred from the technological laboratory at White Horse, N. J., to the Japanese beetle research laboratory of the Bureau of Entomology at Moorestown. The State-owned White Horse laboratory was reconducted for occupancy by the New Jersey Department of Agriculture.

Instructions to Inspectors on the Treatment of Nursery Products, Fruits, Vegetables, and Soil, for the Japanese Beetle was issued on March 14, 1934, as B. P. Q.-359. This 17-page mimeographed circular replaces P. Q. C. A.-224, dated April 16, 1929, and 7 supplements issued later. These instructions now assemble in a single manual complete details of all types of treatments currently employed as a basis of quarantine certification under the regulations.

CERTIFICATION OF FRUITS, VEGETABLES, AND CUT FLOWERS

For the first time since 1923 it was possible to maintain a continuous 24-hour fruit and vegetable inspection service in the Philadelphia market district from June 15, the effective date of the seasonal quarantine on these commodities, until the restrictions were lifted. The fumigation of bananas loaded at wharves on the Philadelphia water front was also unnecessary. In the Philadelphia market and water-front districts where formerly there have been dense flights of the insect, the adults in 1933 were present in greatly reduced numbers. It was still possible to find beetles in fair quantities in these sections, but swarming did not occur.

Advantageous prices in Chicago, St. Louis, Detroit, Indianapolis, Cleveland, and Cincinnati for string and lima beans grown in southern and central New Jersey and eastern Pennsylvania occasioned an unprecedented demand for the inspection and certification of these commodities. The midwestern drought of 1933 and the large influx of visitors to the Century of Progress Exposition at Chicago probably created the great demand for eastern-grown beans. Speedy inspection of the large quantities of beans examined was accomplished through the use of 22 mechanical bean-inspecting machines. The largest number of beetles separated from a single consignment consisted of 430 specimens removed from a carload of 667 bushels of string beans consigned from Morrisville, Pa., to Chicago. During the height of the bean inspection there was a differential of \$0.95 per bushel between the price obtained in the midwestern markets and that received on the New York market. Approximately 9,900 beetles were removed from the machine-inspected beans.

Observations in sections from which quarantined fruits and vegetables were being certified showed that adult-beetle flight had, by the middle of September, subsided enough to justify the removal of the restrictions on these two items. Accordingly, the seasonal restrictions on the movement of fruits and vegetables were lifted, effective on and after September 15. Restrictions on the movement of cut flowers were allowed to remain in effect until October 15. Inspectors in the Philadelphia wholesale cut-flower market found adult beetles in cut flowers as late as October 5.

VEHICULAR INSPECTION

Already established for approximately 3 months at the beginning of the fiscal year, 25 vehicular inspection stations continued in operation on the borders of the regulated territory in Virginia, and along the Maryland-West Virginia, Pennsylvania-West Virginia, and Pennsylvania-Ohio State lines. A roving patrol of Pennsylvania inspectors continued to check traffic on exit highways leading into the nonregulated territory in the northwestern part of the State. The 4 State-employed inspectors comprising a mobile patrol on highways at the boundary of the regulated zone in northwestern New York continued their schedules on 10 roads until October 16. At the end of October the personnel at the remaining posts was reduced from 53 to 42 men. Ten of the remaining inspectors were relief workers, supplied through the Pennsylvania Emergency Relief organization. Closing of the remaining 31 stations was accomplished from November 9 to 15.

Road patrol for 1934 was begun on March 27 with the establishment of two posts in Virginia. Additional stations were opened shortly thereafter. By the

end of April there were in operation 7 posts in Virginia, 2 posts on the Maryland-West Virginia State line, 1 post in West Virginia, and 7 posts on the Pennsylvania-West Virginia and Pennsylvania-Ohio State lines. On the border of the regulated zone in northwestern Pennsylvania there were 3 established posts operated by 1 inspector each, with 2 additional inspectors supplied with cars guarding 8 other exit highways in that section.

Fumigated soil was kept on hand at all road posts. This permitted the removal of soil from uncertified stock, the replacement of the possibly infested soil with treated soil, and the certification of the plant material at the post. Consequently, the private motorist transporting a few plants was not obliged to surrender his uncertified material or return it to a designated inspection center for certification. This procedure reduced to a minimum the quantities of quarantined products surrendered at the road posts. Statistics covering the fiscal year's operation of the road patrol showed that 2,768,060 vehicles stopped at the posts. Of these, 18,959 were found to be carrying uncertified quarantined material. In the course of the examination of soil removed from articles inspected at the road stations, 112 Japanese beetle larvae were collected.

SURVEY OF DAMAGE IN HEAVILY INFESTED SECTIONS

The canvassing of farmers, estate owners, city residents, and superintendents of golf courses, parks, and cemeteries was undertaken in 1933 to determine expenditures for control of the Japanese beetle and actual losses from crop destruction by the insect. Two men were assigned to this work during July and August. Supplemental survey work was performed by regular New Jersey and Pennsylvania personnel as their seasonal inspection duties permitted. The survey was designed to procure signed statements from individuals showing definite and accurate losses and control costs. Interviews and correspondence were confined to individuals in the area of continuous Japanese beetle damage. Conditions representative of the degree of injury to be found rather generally throughout the entire zone of continuous damage were selected. Information concerning extreme localized injury by the insect was discarded. Indefinite or questionable data were also omitted from the final tabulations. Twenty-nine golf clubs reported average annual expenditures of \$618 per course for the control of Japanese beetle grubs. These courses reported total expenditures for this purpose of \$60,000 over a period of years. The yearly total cost of trapping, spraying, and sod treatment on 19 private estates averaged \$513 per estate. Average annual expenditures of \$225 per unit were reported by superintendents of 11 cemeteries, parks, and community-spraying organizations. In the city-block canvass, inquiries were made of all residents in 4 blocks each in Philadelphia and Trenton, 2 blocks in Princeton, N. J., and 1 block in Lawrenceville, N. J. These blocks were selected at random. Expenditures by individual property owners in these blocks averaged \$2.50 per year. Annual expenditures per block were \$62.80. Nineteen growers, whose field corn plantings totaled 511 acres, submitted statements showing that their corn crop was injured from 3.5 to 80 percent. Their cash losses totaled \$2,540, or an average of approximately \$5 per acre. Thirteen sweet corn growers with 195 acres of this crop reported crop losses through beetle injury averaging 35 percent. The average loss per acre was approximately \$17.50. Commercial orchardists whose holdings include 37,000 bearing apple trees reported an average fruit injury of 43 percent on 6,300 apple trees of the varieties susceptible to beetle injury. Crop loss from this injury amounted to \$12,200. Eleven of the 13 reporting orchardists applied sprays specifically for Japanese beetle control at a total cost of \$700. The average apple injury per acre was \$123. The average control cost per acre was \$7.15. Commercial peach orchards covered in the survey include 10,600 trees of the varieties particularly subject to Japanese beetle injury. The normal yield of these varieties was reduced 27 percent, resulting in loss of sale of 9,100 bushels valued at \$12,500. Ten of the 18 orchardists attempted spray control at a total cost of \$712. This was an average injury per acre of \$154, plus an average per-acre expenditure for control of \$8.80. The survey also extended to 28 farms, comprising 3,480 acres. The total crop damage on these farms amounted to \$6,130, or an average of \$219 per farm. This was an average per-acre loss of \$1.76. The canvass also included cost of control and crop losses by growers of grapes, raspberries, strawberries, blueberries, and greenhouse-grown roses. As a result of the canvass, there is now available an abundance of reliable evidence concerning the extent of Japanese beetle injury to various crops, together with accurate costs of protecting susceptible plants from adult and larval attack.

OCEAN AND BAY FLOTATIONS

One unusual occurrence observed for the first time in 1933 was a large flotation of Japanese beetles in Delaware Bay, and another in Raritan Bay and the Atlantic Ocean at Staten Island and Long Island. When first observed, quantities of beetles were being washed in with the tide at a beach near Delaware City, Del. Quite an infestation was observed feeding on nearby foliage. Beetles were later found washed up on Woodland Beach in lower Delaware. Most of the beetles were dead when washed ashore, but a goodly number of the survivors recovered and began feeding. Six Delaware-owned traps placed at Reedy Point Bridge caught 3.5 quarts of beetles in 2 weeks, and 18 traps set at Woodland Beach collected 7.5 quarts. Beetles in considerable quantities were washed ashore along Delaware Bay from Delaware City south to Kitts Hammock, a stretch of about 40 miles. Sections adjoining this coastal area are important agricultural sections of the State. A still heavier flotation was observed in Raritan Bay between New Jersey and Staten Island, N. Y. Large numbers of the beetles were washed up along the shore near Princess Bay, on the southwestern shore line of Staten Island. A large number of beetles could be picked up for a distance of several miles. About 25 percent of them were able to crawl. Further evidences of beetle flotation were noted along the southern shore of Long Island. A distinct line of Japanese beetles along the beach at high tide was observed on Long Beach. It was estimated that there was an average of 100 dead beetles per yard along the high-tide line. Nearly the same number of beetles was found at Point Lookout, 10 miles farther east. Examination of 10 miles of shore line at Jones Beach disclosed beetles remaining from the high tide of the previous day. At the easternmost point examined, the number of beetles decreased to an average of approximately 1 per inch. This would indicate an eastward drift of beetles for at least 60 miles from the heavily infested sections of New Jersey and Staten Island. From 5 million to 10 million beetles were washed ashore along the 60-mile stretch from the eastern point of Long Island to the Suffolk County line.

STATE AND COMMUNITY CONTROL ACTIVITIES FOR BEETLE-POPULATION REDUCTION

Early in the summer of 1933 sprays of coated lead arsenate were applied to foliage in the heavily infested sections of Laurel, Elkton, and Colgate, Md. Bait-dispensing cages were also distributed in these localities. This work was performed in cooperation with the Maryland State Horticultural Department. Sixty-two hundred traps were also distributed in 38 Maryland localities of known infestation within the regulated zone for the purpose of reducing beetle population. These traps caught over 1,400,000 beetles. One million one hundred thousand of this total were trapped at an open-field infestation near Elkton. The State of Delaware operated 814 State-owned traps at 17 points, and made catches totaling 164,000 beetles.

This year's suppression campaign carried on by the New Jersey Department of Agriculture involved the use of 980 traps, each having a 40-quart container, and 300 standard-sized traps. These were distributed to 150 farmers, whose catches totaled over 47 tons of beetles. In New Jersey favorable trapping weather was limited to less than 3 weeks, between July 1 and 9 and July 17 and 25. During 3 days in the first week in July, 6 large-sized traps captured 65 gallons of beetles. Also in New Jersey, 700 State-owned traps were used in determining degrees of infestation in 15 towns and around several lakes in the northern counties of the State.

The Rhode Island Department of Agriculture also set out 807 State-owned traps in 6 cities. Trap and hand collections were made totaling 45,000 beetles. Three hundred and sixty-three Connecticut-owned traps were operated in Middletown, Manchester, Putnam, and Winsted. These traps captured 147 beetles.

In cooperation with the State authorities of Virginia, 2,057 traps were operated in 8 previously infested cities in the regulated area. These traps caught approximately 39,000 beetles. The operation of traps for beetle-population reduction in the District of Columbia resulted in catches of over 315,000 beetles.

Active campaigns designed to reduce Japanese beetle populations to a minimum were sponsored during the summer of 1933 by a number of civic organizations and municipal officials in Barrington, Hackensack, Manville, Perth Amboy, Spotswood, and Woodbridge, N. J., and Mount Vernon, N. Y.

Large-sized Japanese beetle traps were sold by a committee of the New Jersey Board of Agriculture at \$1.50 each to 510 purchasers throughout New Jersey and in Norfolk and Richmond, Va.; West Grove and Allentown, Pa.; Bronxville, N. Y.; and Stamford, Conn. Traps of the type sold were not available through regular commercial channels.

INFORMATIONAL ACTIVITIES

Four reels of motion pictures depicting Japanese beetle quarantine and control work were released early in November. Two reels are entitled, "Methods of Control." The other two reels portray life history, damage, and spread. These have been shown before a number of audiences this year.

Sectioned Japanese beetle traps were displayed at the Pennsylvania farm show in Harrisburg from January 15 to 19 and at the New Jersey agricultural fair held at Trenton, N. J., from January 23 to 27.

Twenty-six photographs showing various phases of quarantine activities, together with suggested titles for the pictures, were furnished to the university extension division of the University of Wisconsin. These photographs were made into lantern slides for use in a set of educational pictures for distribution to the schools and colleges in the State. In addition, a set of selected photographs illustrating typical plant-quarantine situations was furnished to a publisher of school textbooks in Newark, N. J., for use in illustrating a general science textbook. Literature concerning the insect has been furnished to numerous schools and museums for the use of students interested in insect study.

CERTIFICATES ISSUED, VIOLATIONS INVESTIGATED, AND PROSECUTIONS INSTITUTED

Certificates of all types issued during the 12-month period total 526,504.

Listed in table 5 are the quarantined articles fumigated or sterilized during the fiscal year. These articles were intended for shipment from the regulated territory or for use in certified greenhouses or as surface soil in nursery plots, heeling-in, or plunging areas.

TABLE 5.—*Materials fumigated or sterilized under Japanese beetle quarantine regulations, fiscal year 1934*

Material treated	Treated with—			
	Arsenate of lead	Carbon disulphide gas or emulsion	Naphthalene	Steam
Plants.....number.....	33,850			
Potting soil.....cubic yards.....	15	2,189	17	949
Mushroom soil.....do.....		142		
Manure.....do.....		3		19
Leaf mold.....do.....		2		
Sand.....do.....		1,681		17
Surface soil.....square feet.....	94,656	8,500	17,098	
Surface soil with plants.....do.....	128,433			
Berries.....crates.....		2,388		

Nursery and ornamental stock, sand, soil, earth, peat, compost, and manure were certified for shipment from infested premises within the regulated zones during the fiscal year in the following quantities:

Plants.....	number.....	19,616,209
Sand, earth, and clay.....	carloads.....	6,654
Peat.....	do.....	57
Manure and compost.....	do.....	163

A total of 171,348 shipments not individually recorded as to contents proceeded under certification from nursery premises determined as uninfested. In addition, 53,683,940 plants were certified for movement between classified dealers within the regulated territory.

Fruits, vegetables, moss, and cut flowers certified during the seasonal quarantine on these articles were as follows:

Fruits and vegetables.....	packages.....	3,030,788
Sphagnum moss.....	bales.....	2,616
Cut flowers.....	packages.....	48,031

Violations reported from all sources during the fiscal year numbered 1,101. Apparent violations on the part of private individuals were investigated by letter. Where necessary, all shippers of uncertified material were furnished with quaran-

tine literature and informed of the quarantine official through whom future certification might be obtained. Irregularities on the part of express and freight agents were investigated through the general managers of the common carriers. Of these violations, three were considered so deliberate and flagrant as to justify prosecution in the United States district courts. Two of these prosecutions were pending at the end of the fiscal year.

COOPERATIVE FINANCING

Effective cooperation in quarantine enforcement and suppressive measures was supplied by infested States. Finances for joint activities were made available during the year by Connecticut, Delaware, Maine, Maryland, Massachusetts, New Jersey, New York, Pennsylvania, Rhode Island, and Virginia. Officials of the Michigan Department of Agriculture and the Detroit Department of Parks cooperated in measures to combat the infestation in Detroit.

EUROPEAN CORN BORER CERTIFICATION

Federal certification to authorize the movement of restricted commodities to the eight States requiring a certificate issued by a Federal inspector continued with the European corn borer inspection corps already in the field at the beginning of the fiscal year. In June Utah was added to the list of States permitting the entry of certain likely carriers of the corn borer (*Pyrausta nubilalis* Hbn.) when accompanied by a Federal certificate. States imposing similar requirements during the entire year were Arizona, California, Colorado, Georgia, Louisiana, Nevada, and Oregon. In the course of the year corn borer inspectors issued Federal certificates covering 10,418 shipments of restricted commodities. The value of articles certified is conservatively estimated at over \$100,000. Owing to a general decline in fall trade among dealers in quarantined material, demands for certification during the fall and winter were at a minimum. In April there began a distinct upward trend in the movement of plant material and farm products requiring inspection, resulting in the certification during the last quarterly period of over 80 percent of the year's volume of inspections. Of the total number of shipments certified, New Jersey led with 4,300, followed by the Massachusetts-New Hampshire district with 1,471, Pennsylvania with 1,456, and New York with 1,365. The rest of the shipments were distributed throughout the remaining infested States.

In sections of the Japanese beetle regulated territory where the volume of inspection could be handled without interference with the regular routine, Federal inspection and certification to comply with State corn borer quarantines was supplied by the Japanese beetle inspection personnel. The certification requirements in northern New Jersey and Long Island were sufficient to justify the assignment of a full-time corn borer inspector to perform the certification work in that section. Two corn borer inspectors in central New York, and single inspectors in southeastern Connecticut and western Pennsylvania cooperated with the Japanese beetle personnel in joint certification of quarantined commodities. Otherwise, throughout the States quarantined on account of the Japanese beetle, corn borer certification work was performed by the permanent enforcement personnel.

Wherever possible a joint-certificate stamp was impressed on the shipment to cover both quarantines. Insertion of the letters ECB after the numeral 48, representing the Japanese beetle quarantine, was employed to indicate such joint certification. Inspection service in States in the 1-generation corn borer infested zone and outside the Japanese beetle infested territory was performed by five corn borer inspectors. An inspector stationed in Grand Rapids covered most of the State of Michigan outside the environs of Detroit. The work in and near Detroit required that an inspector be stationed in that city. Another inspector with headquarters at Indianapolis made all corn borer inspection within the State of Indiana. Effective inspection throughout the State of Ohio required the services of two inspectors, one working in the northern part and the other in the southern part and in West Virginia.

Few important changes were effected in the State quarantine orders operative at the beginning of the fiscal year. The Arkansas State plant board issued an amended quarantine effective February 3, 1934, rephrasing the State regulations regarding the movement of all classes of restricted articles from the 13 States designated as infested. A revision of the Kansas quarantine in the interests of uniformity with other State quarantines became effective July 1, 1933. The Missouri and Nebraska quarantines were rewritten in the uniform style adopted

by many of the quarantining States. The Missouri quarantine was reissued effective July 10, 1933. The first revision of the Nebraska notice of quarantine was effective January 15, 1934. An Ohio corn borer quarantine against the 2-generation form of the insect was promulgated on July 7, 1933. A revision of the Utah quarantine prohibiting the movement of carriers of the corn borer from infested States was issued August 5, 1933. The Washington State quarantine order pertaining to the corn borer was reissued in the same form on July 11, 1933.

Indiana, Michigan, and Ohio, although infested with the 1-generation form of the borer, uniformly restrict the movement into their boundaries of all classes of quarantined commodities from the New England States, New York, New Jersey, Pennsylvania, and Virginia, these 10 States being designated as infested with the 2-generation form.

There now remain but six uninfested States (Alabama, Delaware, Minnesota, Montana, North Carolina, and North Dakota) which have taken no quarantine action to restrict the movement into their borders of likely carriers of the corn borer.

In June 1934 a representative of the State Board of Agriculture of Utah agreed to accept Federal certification of articles usually eligible for certification under the customary form of State corn borer quarantine. Prior to this administrative action, the Utah quarantine had acted as a complete embargo against the entry into the State of articles designated in the regulatory order. With the Utah embargo restrictions modified, the Wyoming quarantine is now the only State order completely prohibiting the importation into the State of all classes of quarantined articles from States in both the 1-generation and 2-generation zones.

Regulatory measures remained unchanged during the fiscal year as promulgated in the form of notices of quarantine, quarantine orders, proclamations, warnings, rules, and regulations, or revisions, modifications, or amendments thereof, by the States of Arizona, California, Colorado, Florida, Georgia, Idaho, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, Michigan, Mississippi, Nevada, New Mexico, Ohio, Oklahoma, Oregon, South Carolina, South Dakota, Tennessee, Texas, Virginia, Wisconsin, and Wyoming.

Commodities requiring certification for movement from the States uniformly regarded as infested with the 2-generation strain of the corn borer include, in most of the State quarantines, lima beans in the pod; green shell beans in the pod; beets with tops; rhubarb; cut flowers or entire plants of chrysanthemum and aster; and cut flowers or entire plants of gladiolus and dahlia, except the corms and tubers thereof, without stems.

Articles designated in most of the State quarantines as requiring certification from all States commonly designated as infested with either strain of the borer, comprise the stalks, ears, cobs, or other part or debris of corn or broomcorn, sorghums, and Sudan grass, except clean shelled corn and the seeds of broomcorn, sorghum, and Sudan grass.

Growers shipping plant material subject to either State or Federal certification under the State corn borer quarantine orders and regulations have in numerous instances expressed a decided preference for Federal inspection service. Some dealers have stated that Federal certification apparently carries with it a more official recognition of the measures growers take to rid their stock of infestation, and also elicits more interest on the part of the consignee receiving the material. The expeditious service rendered by Federal corn borer inspectors was also cited as facilitating the movement of orders requiring certification.

All State corn borer quarantine orders were reviewed during January and information contained in the quarantines tabulated in the form of a six-page mimeographed shipper's guide showing the requirements for shipments consigned to States having quarantines on account of the borer. Copies of the shipper's guide were distributed to all growers or dealers known to be shipping quarantined commodities from infested States. Later, summaries of the current State quarantine regulations were compiled by the Division of Domestic Plant Quarantines in more detailed form and issued as circular B. P. Q.-346, revised March 15, 1934.

February and March seasonal declines in shipments of articles requiring Federal inspection permitted a number of the inspectors to devote considerable time to transit-inspection work. Only such hours were spent in transit inspection as could be spared without interference with regular inspection duties. Inspectors were thus available for transit inspection in Detroit, Cleveland, Pittsburgh, and New York City. In addition, during the trapping seasons in 1933 and 1934, inspectors engaged exclusively on corn borer inspection work

in Ohio, Indiana, Michigan, and Long Island were temporarily reassigned to supervise some of the trapping activities in nonregulated Japanese beetle territory. This work was in exchange for an equal amount of time devoted to corn borer inspection work by the regular Japanese beetle personnel in Connecticut, New Jersey, and Pennsylvania.

Sweet corn harvested in Rhode Island in July 1933 had from 35 to 75 percent of the ears infested with corn borers, according to the Rhode Island Department of Agriculture. Corn borer infestation was general throughout the State in 1933, although it was more serious where corn was grown in large quantities. The wide-spread infestation was attributed to unusually wet weather in the early spring, which prevented a postponed clean-up of the cornfields and also favored the development of the corn borer larvae. Inspection by State employees of Rhode Island fields where corn was grown in 1933 was begun early in April 1934. Owing to the wet condition of the fields in some parts of the State, the clean-up date was extended from April 20 to May 15.

In Connecticut, the first-generation borers caused considerable damage in early sweet corn, some fields being a total loss. Surveys to ascertain the extent of the 1933 commercial damage done by the corn borer and the approximate borer population in Connecticut were made under the direction of the Connecticut Agricultural Experiment Station from the middle of July until late in October. Thirty-nine farms on which were grown 192.5 acres of early sweet corn were visited. Total damage amounting to \$11,320, or an average of \$58.80 per acre, was reported. Thirty-seven growers having a total of 32.5 acres of late sweet corn experienced a net loss of \$850, or an average of \$26.15 per acre. The borer population count, made during October, included the same towns in which a similar survey had been made in 1932. A large increase in borer population was indicated. With the exception of two towns, an average annual increase of 100 percent was observed. The survey was made in sections adjacent to New London, Glastonbury, and Milford. Connecticut's 1934 spring corn borer clean-up, under the supervision of the State Agricultural Experiment Station, began on April 18 and was concluded late in May. Twenty-one men, each equipped with a light truck, were assigned to patrol every road in the State to locate any fields or lots containing cornstalks. A few prosecutions under the Connecticut General Statute were necessary to secure the complete destruction of the stubble and stalks observed in the course of the survey.

There were no scouting activities under Federal supervision for the purpose of determining the absence or presence of the borer in territory outside the previously regulated zones. The only field-inspection work reported to the Bureau was that performed under the auspices of the Wisconsin Department of Agriculture. Specimens of the borer submitted for identification by the Wisconsin authorities indicate that corn borer larvae were recovered during the summer of 1933 in the following townships of the State: Liberty Grove, Sevastopol, and Sturgeon Bay, Door County; West Kewaunee and Carlton, Kewaunee County; Two Rivers, Manitowoc County; Herman, Sheboygan County; Calumet, Fond du Lac County; Germantown, Washington County; Mequon, Ozaukee County; Granville and Milwaukee, Milwaukee County; Caledonia, Racine County; and Somers and Pleasant Prairie, Kenosha County. Infestations previously had been found in Manitowoc, Sheboygan, and Racine Counties; otherwise, the collections represented first-record finds in the respective counties. With the exception of the infestations in Fond du Lac and Washington Counties, all first-record finds were in townships bordering on Lake Michigan, or contiguous to coastal townships. Infestations were discovered in the northernmost and southernmost townships bordering on the lake, indicating a wide range of infestation along the lake front.

PINK BOLLWORM

The release of the Salt River Valley of Arizona from the quarantine enforced to prevent the spread of the pink bollworm (*Pectinophora gossypiella* Saund.), progress in the extermination of the recent Florida outbreak, and the discovery of the insect in Georgia and in additional sections of Florida, New Mexico, and Texas, were the most important developments of the year in the pink bollworm situation. They indicate, on the one hand, the practicability and effectiveness of the suppressive measures now in use for accomplishing eradication, but, on the other hand, the continuous danger of reinfestation from Mexico and other parts of the world.

The new findings involve 1 county in Florida, 3 in Georgia, 2 in New Mexico, and 8 in Texas. As the infestation is light, there is no cause for undue alarm,

because similar infestations in the past have yielded to eradication measures. The pink bollworms are so scarce in these areas that they would probably have remained undiscovered, had it not been for improved methods of detecting them, particularly the use of the gin-trash machine. With this machine new infestations can be found while still exceedingly light, and without the expenditure of unduly large sums. The discovery of such infestations at a very early stage facilitates prompt control.

NEW INFESTATIONS IN GEORGIA AND FLORIDA

On September 18, 1933, two larvae were discovered in gin trash at Enigma, Berrien County, in the southern part of Georgia, and 4 days later another specimen was found in gin trash at Brookfield, Tift County, about 5 miles away. This is the first time the insect has ever been found in the cotton fields in Georgia, and the infestation is very light, as is the case in the other new areas. Immediately after these findings additional inspectors and gin-trash machines were sent to the area, and the State entomologist also placed a number of his men in the field. Gin-trash inspections were continued until the end of the season without any more specimens being found. Field inspections were concentrated in Berrien and Tift Counties, particular attention being given to the area around Enigma. It was not until October 27 that worms were found in the fields, on which date 9 living specimens were taken in a planting $2\frac{1}{2}$ miles south of Enigma. The following day another specimen was taken on an adjoining farm. The field inspections were continued for some time without any additional specimens being found.

The fact that so few specimens were found as a result of the intensive inspections indicates that the infestation is extremely light and that a very small area is involved. This made it advisable to conduct a field clean-up campaign, and all fields within a radius of about $1\frac{1}{2}$ miles of the two infested fields were cleaned during November and the early part of December. The fields were small and scattered, and the work involved only 227 acres, which were cleaned at an average cost of \$4.39 per acre.

Shortly after this the Agricultural Adjustment Administration inquired of this Bureau as to the practicability of utilizing the cotton-curtailment program to aid in the control and eradication of the pink bollworm. After some consideration it was decided to eliminate the growing of cotton from the area where field clean-up had been conducted for the 1934 crop season. The farmers involved willingly signed contracts covering the acreage. About four rows of cotton, each 10 feet long, were planted in the two fields where infestation had been found, to see whether or not there would be a recurrence of the infestation. All of the blooms were to be picked daily and, as the cotton had been considerably retarded by rains, only a few had been produced by the close of the fiscal year. These were inspected without any signs of the insect being noted.

On September 22, 1933, one dead larva of the pink bollworm was discovered in gin trash at Madison, Madison County, Fla. This county is west of the area in Florida where infestation was found in 1932, but where no pink bollworms have since been discovered. Intensive gin-trash inspections were carried on in Madison and adjacent counties throughout the remainder of the season without any additional specimens being found. After the discovery of the larvae in gin trash, a considerable amount of field inspection was done in an effort to locate the infested field, but without success.

The measures taken to prevent the spread of the new infestations in Georgia and Florida included, in addition to the cotton-free zone described, primarily the extension of the Federal quarantine to the infested areas, the heat treatment of $91\frac{1}{2}$ tons of seed, and the compression of the lint produced in those areas, the disposal of gin trash, and clean-up of gins and oil mills after the close of the season's operations.

WILD COTTON IN SOUTHERN FLORIDA

The eradication of wild cotton in southern Florida is being undertaken to eliminate a severe pink bollworm infestation which was discovered in 1932. The Cotton Belt of the Southeastern States can never be considered safe from infestation so long as the insect persists in the wild plants on the keys and along the coast.

Because of climatic conditions this eradication work can be carried on only in the fall, winter, and early spring. The work this past season was begun about the first of November, and especially good progress has been made. All of the areas previously cleaned were recleaned, and in addition an original clean-up was

conducted over some 4,000 acres. This is the acreage from which plants were actually removed, and not the total acreage covered, as a very large area had to be scouted to locate the plants. Approximately 375,000 mature and 150,000 seedling plants were removed from the area cleaned for the first time. From the area recleaned approximately 9,500 mature, 1,280,000 seedling, and 110,000 sprout plants were removed. The greater portion of these plants during both the first and second clean-ups was removed from the Cape Sable area. The cotton at Cape Sable is not very accessible, and while the work was being carried on this past season it was necessary for the men to cut some 25 miles of trails so that the laborers could be transported directly to the cotton. It was also necessary to construct a number of bridges over canals. These bridges were made of drift lumber and logs without any expense to the Department, and considerable ingenuity was exhibited by the inspectors in constructing them. Many of the keys in Florida Bay were cleaned for the first time. Most of the cotton remaining to be cleaned is in the Cape Sable area, and some is on keys in Florida Bay. Toward the close of the fiscal year a second recleaning this season was made along the west coast from Naples northward and on the mainland keys over which the highway passes so as to prevent any seedlings from producing fruit before the work can be resumed next fall. Since the clean-up was begun in June 1932 approximately 1,000,000 mature, 250,000,000 seedling, and 130,000 sprout plants have been removed from some 9,500 acres. As an example of the progress being made, it is of interest to note that the first clean-up on Lower Matecumbe Key in 1932 required 114 man-days. Naturally part of this time was devoted to cutting trails through the dense growth to reach the cotton. This key was recleaned in April of this year and required only 26 man-days. A second recleaning was made in June, and this required only 4 man-days. Each time an area is recleaned considerably less time is required, as there is less cotton to be removed and the inspectors know just where it occurs. On the west coast several places where colonies were cleaned last season were found to be entirely free of cotton this season.

Last year some experiments were begun to determine the practicability of destroying wild cotton with poison. It has now been determined that this can be done, but the poisoning treatment alone is rather expensive. Therefore, a combination method has been worked out whereby the poison is applied only to plants growing in rocky places where they cannot easily be grubbed. The most effective method of applying the poison is to cut the plant off, leaving a stump from 3 to 6 inches high. The stump is then lacerated and about half a pint of sodium arsenite solution, in the proportion of 2 pounds of sodium arsenite to a gallon of water, is poured on it. Excellent results are now being obtained with this treatment.

As noted in last year's report, several small experimental plantings of cultivated and wild cotton were left at Chapman Field to avoid any possibility of driving the pink bollworm to some other malvaceous plant. In cooperation with the Bureau of Plant Industry, all fruit from this cotton was removed and inspected. Incidental inspections of *Hibiscus* and okra blooms were also made from time to time. On August 23, 1933, 2 pink bollworm larvae were found in *Hibiscus* blooms, the plant having been identified as *Hibiscus rosa-sinensis*, a hybrid. Immediately after this finding an intensive examination of *Hibiscus* blooms, particularly in the vicinity of Chapman Field, was made, and the examinations were continued from time to time until the close of the year without any more specimens being found. It therefore appears that the above infestation was casual, and that no general infestation exists in *Hibiscus*. The results of the inspection of cotton blooms continued negative until June 19, 1934, when 1 larva was found, followed by 2 on June 21, and 4 additional ones the last week of June. The last finding before this was in March 1933, at which time it was attributed to overwintering larvae in the soil. These later findings, however, indicate that the infestation is now coming from some outside source, and efforts are being made to locate it.

CLEAN-UP IN BIG BEND AREA OF TEXAS CONTINUED

The special control program begun in the Big Bend area last season to reduce the heavy infestation and thereby lessen the danger of spread of the pink bollworm to the main Cotton Belt has been continued. The measures consist of the clean-up of fields and premises after picking is completed, delayed planting the following spring, and the use of trap plots of cotton. As stated in the last annual report, infestation had been found by June 30, 1933, in 47 of the 67 plots and in only 14 of the adjacent fields. These trap plots were continued until the middle of July, at which time the field cotton had reached the same size and fruiting stage

as the plot cotton. Worms had been found in 60 of the trap plots and 37 adjacent fields, indicating that the infestation was building up slowly. This was further borne out by the results of the gin-trash inspection which began the latter part of August. In the first 5 bales ginned an average of 136.6 worms per bale was found, whereas the previous season the first cotton from this same farm contained an average of 1,160.5 worms per bale. Another farm had an average of 336.5 worms per bale in the first cotton of the 1933 crop, whereas the first cotton of the 1932 crop had contained an average of 922 pink bollworms per bale. The infestation continued to increase, and by the end of the season as many worms per bushel were being taken in gin trash as in the 1932 crop. The number of worms found during the two seasons is hardly comparable, however, as floods put an end to gin-trash inspection in 1932. If these floods had not occurred there is very little doubt that a considerably larger number of worms would have been found in the 1932 crop than in the 1933 crop. The actual field damage was considerably less than that in the previous year.

During the 1933 crop season, as the farmers feared another flood, the cotton was picked as fast as it opened, and ginned. This permitted the cleaning of fields early in November, the most heavily infested ones being cleaned first. In Brewster County 130 acres were cleaned, and 3,305 in Presidio County, making a total of 3,435 acres for the area. This was cleaned at an average cost of \$3.49 per acre. The previous season the average cost per acre was \$4, the decrease being due in part to the fact that the laborers were able to do better work on account of the previous year's experience, but principally to the fact that much more assistance was received from the farmers. They realized that it was to their advantage to help in this undertaking, and one of them furnished a truck and driver, while others furnished sacks and tools and spent considerable time in the field assisting in the work without any remuneration. In addition to the field clean-up, a clean-up was made along certain roads where the underbrush had dragged seed cotton from the wagons. This was followed by a house-to-house canvass, and all places where cotton had been stored, together with all trucks, wagons, etc., used in hauling seed cotton, were cleaned.

Trap plots were used again this season, but they were confined to the most heavily infested part of the area. A total of 25 plots, consisting of 400 plants each, were put out in the Presidio section. These plants were grown in hotbeds and later transferred to the fields. On one farm in this section some stub cotton came up, and about 60 plants were left as a trap. In Brewster County two $\frac{1}{2}$ -acre plots were used, the cotton having been planted in the field early in March. Fortunately no cold weather was experienced and these plots did very well. The first blooms occurred the latter part of May, and a few worms were found in the two plots in Brewster County and in the stub plot in the Presidio section. By the end of the fiscal year worms had been found in all but 3 of the 28 plots. The moths seem to have emerged later than usual this year, and during the first part of June the number of worms increased rapidly, but there was a considerable reduction during the latter half of the month. The State requirement that planting be delayed until April 15 was uniformly observed throughout the area. Cool weather set back the field cotton somewhat and it had just begun to bloom toward the close of the year, with the result that only 29 worms had been found in 8 fields adjacent to the trap plots.

NEW AREAS INVOLVED IN NEW MEXICO AND TEXAS

The two counties involved in New Mexico are adjacent to those involved in the newly infested area in west Texas and, as much the larger part of the cotton produced in them is ginned in Texas, these two areas will be discussed together. The first worm was found on October 17, 1933, during an inspection of gin trash in Gaines County, Tex. This finding was followed by others in Dawson, Terry, Hockley, Lamb, Bailey, Cochran, and Yoakum Counties. The findings in cotton from Lea and Roosevelt Counties, N. Mex., were made while the cotton was being ginned in Texas counties. Following the findings in gin trash a considerable amount of field inspection was carried on, and as a result an infested field was located in each of the 2 New Mexico counties and in 4 of the Texas counties.

After infestation had been found in this area, steps were immediately taken to safeguard the movement of cotton products from it. It was too late in the season to have seed-heating machines installed. Therefore arrangements were made to have all the seed moved to certain designated oil mills. Seed is cooked by millers to improve its working qualities, and seed from dry areas is often cooked at the very beginning of the milling process in order to soften it. The cooking temperature used is approximately 175° F., which is amply sufficient to kill any pink

bollworms. Therefore the seed was required to be heated to this temperature or higher and only such mills were designated as met this requirement. A number of compresses were also designated to take care of the lint. It is gratifying to report that all of the plants involved cooperated whole-heartedly in this undertaking.

A check of the gin records disclosed that considerable quantities of seed had been returned to the farms, especially in the area of western Texas. As some of the seed undoubtedly contained living worms and would be used for planting purposes, steps were taken to have all of this seed sterilized. The work was done by the State authorities under the supervision of inspectors of this project. Approximately 4,300 tons of seed were treated in Texas, and about 115 tons in New Mexico. As this was just a little over half the seed returned to the farms in Texas, a check-up on the farmers shown as having returned seed to the farm but not having had it sterilized was immediately begun. As was to be expected, large quantities of this seed had been used for feeding purposes, and other amounts had later been sold to gins, oil mills, etc. This checking had not been quite completed at the end of the fiscal year, but the results obtained indicated that practically all of this seed would be satisfactorily accounted for. Only a few farmers planted untreated seed, and the acreage involved in such plantings was quite small.

THE SITUATION IN OTHER REGULATED AREAS

Inspections were begun in the Salt River Valley of Arizona early in the spring of 1933 as soon as the cotton began to fruit and were continued throughout the summer until gin trash was available for inspection. The entire output of trash from some of the gins was inspected, and a large percentage of the trash from the others. This work was continued until the middle of December, at which time most of the crop had been ginned and, as no signs of the pink bollworm had been found during the past two seasons, the area was released from quarantine, effective December 23, 1933.

In the remaining areas of Texas, New Mexico, and southeastern Arizona, sufficient trash was inspected to afford information as to the degree of infestation. There was a general increase in all of these areas, except parts of Arizona, the increase being especially marked in the Pecos Valley of Texas and New Mexico. A summary of the various kinds of inspection, together with the number of specimens found, is shown in table 6.

TABLE 6.—Summary of inspections for the pink bollworm in regulated areas, crop season 1933

District	Gin trash inspected		Field inspections		Laboratory inspections	
	Bushels	Boll-worms collected	Man-days	Boll-worms collected	Samples	Boll-worms collected
<i>Formerly regulated areas:</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>
Pecos Valley, N. Mex.	437	182	0	0	111	2
Pecos Valley, Tex.	537	1,463	0	0	190	22
Big Bend, Tex.	118	171,269	0	0	0	0
Hudspeth County, Tex. (southeastern part)	99	14,008	0	0	76	1,883
El Paso Valley, Tex.	466	1,174	0	0	109	5
Mesilla Valley, Tex. and N. Mex.	743	145	0	0	234	4
Tularosa, N. Mex.	18	5	0	0	0	0
Deming, N. Mex.	1	1	0	0	0	0
Duncan Valley, Ariz. and N. Mex.	0	0	0	0	0	0
Safford Valley, Ariz.	1,911	34	0	0	600	0
Salt River Valley, Ariz.	40,252	0	11	0	1,840	0
Tucson, Ariz.	588	0	46	0	669	0
Northern Florida	345	0	22	0	273	0
Total	45,515	188,281	79	0	4,102	1,916
<i>New areas:</i>						
Madison County, Fla.	248	1	123	0	18	0
Southern Georgia	2,624	3	358	10	314	0
Western extension, Texas and New Mexico	5,902	60	259	14	160	5
Total	8,774	64	740	24	492	5
Grand total	54,289	188,345	819	24	4,594	1,921

INSPECTION OUTSIDE THE REGULATED AREAS

Inspections during the 1932 crop season were the most extensive on record, and, considering the negative results, together with the necessity for economy because of reduced appropriations, it was decided to concentrate the inspections of the 1933 crop in those areas most under suspicion. As in past seasons gin-trash inspection was begun in Texas in the lower Rio Grande Valley, and the inspectors operating the machines worked northward as the crop advanced. Machines were also used in Mississippi, Alabama, and South Carolina, and outside the regulated areas in Florida and Georgia. Some inspections were also carried on in the border States of Mexico, most of this being confined to the areas opposite the Rio Grande Valley of Texas. Except in the Juarez Valley of Mexico the results of all such inspections were negative. After the ginning season had ended, laboratory inspection of green boll and bollie samples collected in various cotton States was begun. This work had not been completed at the close of the fiscal year, but thus far the results have been negative.

The amount of each class of material inspected and the State from which it came is shown in table 7.

TABLE 7.—Summary of inspections for the pink bollworm outside regulated areas, crop season 1933¹

State	Gin trash	Man-days of field inspection	Laboratory samples	State	Gin trash	Man-days of field inspection	Laboratory samples
	<i>Bushels</i>	<i>Number</i>	<i>Number</i>		<i>Bushels</i>	<i>Number</i>	<i>Number</i>
Alabama.....	2, 230	6	250	Mexico:			
Florida.....	1, 203	51	360	Chihuahua ¹	110	0	0
Georgia.....	9, 477	28	820	Coahuila.....	37	5	0
Louisiana.....	0	6	1, 000	Nuevo Leon.....	134	0	0
Mississippi.....	522	14	230	Tamaulipas.....	994	0	0
South Carolina.....	493	34	45	Total.....	1, 275	5	0
Texas.....	26, 150	93	2, 320	Grand total.....	41, 350	225	5, 025
Total.....	40, 075	220	5, 025				

¹ All results negative except that 3,577 pink bollworms were found in the Juarez Valley.

CHANGES IN REGULATIONS

During the fiscal year 1934 three changes were made in the pink bollworm quarantine regulations. The first change, effective September 19, 1933, was a revision of the regulations. Under this revision no essential changes were made in the means of control and the prevention of spread of the pink bollworm, but there was considerable rearrangement of the regulations in the interest of clarity and to facilitate administration. The regulated areas were divided into heavily infested and lightly infested areas.

Effective October 24, 1933, the regulations were amended for the purpose of adding Gaines County, Tex., to the regulated area.

Effective December 23, 1933, the regulations were again revised for the purpose of adding the newly infested sections of Florida, Georgia, New Mexico, and Texas to the regulated areas. The revision incorporated the amendment issued on October 24, 1933. At the same time the Salt River Valley of Arizona was released from regulation. At present the regulated areas include 3 counties in southern Arizona, 7 in north-central Florida, parts of 3 in southern Georgia, 9 in southern New Mexico, and 15 entire counties and parts of 3 additional ones in western Texas. Of this area 5 counties and part of another in Texas were designated as heavily infested, and all the remaining area as lightly infested.

NEW MACHINES

In past seasons it has not been practicable or economical to operate the gin-trash machines at isolated gins and at others where the output of trash is quite small. Therefore, during the summer of 1933 a small gin-trash machine was developed which embodies the same principles of separating worms from trash as does the large machine, power being supplied by turning a crank by hand. The machine weighs about 75 pounds and is so built that it can be placed in an enclosed light delivery truck, making it possible for one inspector to operate the

machine. Its efficiency has been thoroughly tested, and it has proved to be extremely useful in scouting activities, several of the infestations this season having been found by means of this small machine.

During the early part of the fiscal year the treating of cotton by steaming, in lieu of fumigation, was developed by the Texas State Department of Agriculture. The equipment consists of a 25-horsepower upright boiler, together with a tube, having a capacity of one bale, and capable of withstanding 25 pounds pressure. Preliminary tests showed that worms could be killed to a depth of 3 inches by a 1-minute exposure to steam under 15 pounds pressure, but in the commercial treatment of lint a 3-minute exposure is given, compression being relied on to destroy all worms below the 3-inch depth. Only cotton from the heavily infested area is required to be fumigated, and as the amount involved is very small the charges are naturally rather high. It was to relieve farmers of this high cost that the State developed and operated two steam-pressure plants during the season.

CONTROL AND ERADICATION MEASURES

The present measures enforced to control and prevent the spread of the pink bollworm from infested areas are (1) the disposal of gin trash, (2) sterilization of seed, (3) the supervision of oil mills, (4) fumigation, compression, steaming, and roller treatment of lint, (5) the establishment of a road station, and (6) cooperation with Mexico.

The disposal of gin trash.—Practically all of the gins are equipped with cleaning machinery through which the cotton passes in the process of ginning. This machinery removes a considerable amount of trash from the cotton, and in infested areas most of the pink bollworms present are discharged with it. The regulations require the daily disposal of this trash by burning, sterilization, or grinding. The Texas and New Mexico regulations require this daily disposal to December 1 of each year, the average date of killing frost being prior to this. In years when there was no killing frost before December 1, the ginners have always cooperated by continuing the daily disposal until a killing frost occurred.

Seed sterilization.—Perhaps the most important single measure for controlling and preventing the spread of the pink bollworm is seed sterilization. All gins within the regulated areas are equipped with machines whereby the seed is heated to a temperature of 145° F. as a part of the continuous process of ginning. A thermograph is installed in the seed-heating machines so that the temperature of the seed is recorded at all times. During the past season 120 of these machines were in operation, and slightly over 90,000 tons of seed were heated. In addition, two special machines were operated to treat planting seed. This seed is held at a temperature of 145° for 1 hour, after which, with proper handling, it is permitted to move to any destination. Approximately 10 tons of planting seed were so treated.

The supervision of oil mills.—As in past years the lack of oil mills in some sections of the regulated areas made it necessary to designate mills outside the area to handle quarantined seed. Some 10 mills were designated this season, in addition to the 14 mills inside the area. Approximately 64,000 tons of seed were crushed at these mills. Several of the mills are equipped with rollers for treating second-cut or mill-run linters, and 8,865 bales were so treated.

Fumigation, compression, steaming, and roller treatment of lint.—Most of the regulated areas are now designated as lightly infested, and fumigation is not required; therefore, only 4 plants were operated during the season, at which 345 bales of lint and 387 bales of linters were treated. At the seven compresses 148,728 bales of lint and 2,762 bales of linters were treated. A number of gins in the lightly infested area are equipped with rollers, and 56,753 bales of lint and 8,865 bales of linters were so treated. Most of this cotton was produced in the Salt River Valley of Arizona, and the two steam-pressure machines previously discussed treated 4,698 bales of lint.

The establishment of a road station.—A road-inspection station, located 1½ miles south of Marfa, Tex., at the junction of the Presidio and Ruidosa Roads, was operated to prevent the movement of infested material from the Big Bend area. This station was opened on September 1 and closed on December 31, after clean-up operations had been completed. During this period 3,682 cars were inspected and 49 confiscations made. The confiscations consisted principally of small lots of seed cotton, cottonseed, and lint; also 28 cotton-picking sacks were treated and passed. Of the 49 confiscations made, 20 were infested with the pink bollworm, 122 living and 34 dead worms being found. No live specimens were found in seed that had been sterilized.

Cooperation with Mexico.—A considerable amount of cotton is produced in the Conchos and Juarez Valleys of Mexico, these areas being immediately adjacent to the Big Bend and the El Paso Valley of Texas, respectively. This cotton is also infested with the pink bollworm, and the Mexican officials are endeavoring to control the pest with measures similar to those enforced in this country, such as field clean-up, seed sterilization, and safeguarding of products at the oil mills. There is naturally frequent interchange of visits between the inspectors of this project and the Mexican officials in coordinating and carrying out the various measures. An excellent spirit of cooperation has always been maintained.

THURBERIA WEEVIL

During the year only about 400 acres were planted to cotton in the *Thurberia* weevil area of Arizona, necessitating the operation of only one gin. All of the trash produced at this gin was inspected with one of the small machines. As there was not sufficient cotton for the gin to operate steadily, field inspections were made from time to time. After the ginning season closed a general inspection was made of all fields in the area. A supply of bollies was collected, and this material is now being inspected. No specimens of either the *Thurberia* weevil or pink bollworm were found in the area during the entire season.

The same safeguards used in controlling the pink bollworm are also employed in controlling the *Thurberia* weevil. These consist of the disposal of gin trash, sterilization of the seed, compression and vacuum fumigation of lint, and a clean-up of gins, oil mills, etc., at the close of the season's operations. The results of each of these activities are included in the figures given for the pink bollworm.

Effective October 2, 1933, the *Thurberia* weevil regulations were revised. Under this revision the use of various improved treatments and other safeguards that have been developed by the Department in recent years was authorized. The changes in every case provide for the issuance of permits for interstate shipments, on conditions with which it will be simpler and less expensive to comply than it was with those previously required, or under which a wider market for cotton products is authorized. Changes include a provision under which cottonseed given special heat treatment of 145° F. for 1 hour may move to any destination; baled cotton lint may be either fumigated under vacuum, or compressed or roller-treated instead of having to be both compressed and fumigated as heretofore; and cottonseed hulls may be shipped to nonregulated territory after such special treatment as may be required by the inspector. The regulated area includes Cochise, Santa Cruz, and parts of Graham, Pima, and Pinal Counties, in the southeastern part of Arizona.

MEXICAN FRUIT FLY

INFESTATIONS IN TEXAS

The extensive use of glass flytraps during the fiscal year resulted in taking specimens of Mexican fruit flies (*Anastrepha ludens* Loew) from approximately three times as many groves in the lower Rio Grande Valley of Texas as were found infested in any previous year. Despite intensive inspections of the fruit in the 176 groves in which adult flies were taken, no larvae were found until the latter part of April after the end of the harvesting and shipping period, when fruit gleaned from four groves in the tree-to-tree inspections in the Mission district was found infested. Adults had previously been taken in three of these groves. Of interest in the larval findings was the fact that several green "October-bloom" fruit were found infested with full-grown larvae, indicating that the eggs had been laid while the fruit was decidedly immature.

The inability to locate larval infestations, even in view of a 35-day extension of the harvesting period, indicates that the number of flies present in the valley was considerably less than during some previous years, even though the number of groves involved shows a rather general scattered infestation. Traps were operated during the year in 1,440 groves throughout the valley. Adult Mexican fruit flies were taken in 176 groves, or approximately 12 percent of those trapped. This seemingly high rate of infestation may be accounted for by the fact that the most susceptible groves were chosen for trapping, and also by the efficiency of the glass traps. Data accumulated in the trapping work indicated that the adult flies did considerable drifting about. As further evidence of the effectiveness of the traps it is interesting to note that of the 154 females taken, only 30 had eggs in the ovaries, the remaining 124 presumably having been trapped before their

eggs had developed. Undoubtedly in many of the groves the flies were taken before they had had an opportunity for oviposition.

The inclusion of Willacy County, the citrus area of which is a continuation of that in Cameron and Hidalgo Counties, in the regulated area when the quarantine was made effective in 1927, was justified by the taking of 3 adult Mexican fruit flies in 3 groves in that county during the fiscal year. These were the first specimens of *A. ludens* taken in this county.

OTHER ANASTREPHA

In addition to the 280 adult *Anastrepha ludens*, several other kinds of fruit flies of the same and related genera were taken in the traps. These included 511 *A. serpentina* Wied., 312 *A. pallens* Coq., 52 *Toxotrypana curvicauda*, 51 *A. species X*, 31 *A. fraterculus* auct., 16 *A. species Y*, and 1 *A. striata* Schin. The details are shown in table 8.

TABLE 8.—Infestations of fruit flies in Texas, fiscal year 1934

District	<i>Anastrepha ludens</i>			<i>A. serpentina</i>		<i>A. species X</i>		<i>A. species Y</i>		<i>A. fraterculus</i>		<i>A. pallens</i>		<i>A. striata</i>		<i>Toxotrypana curvicauda</i>	
	Adults	Larvae	Premises	Adults	Premises	Adults	Premises	Adults	Premises	Adults	Premises	Adults	Premises	Adults	Premises	Adults	Premises
Mission.....	80	179	45	115	53	12	10	0	0	5	4	39	32	1	1	9	7
McAllen.....	53	---	24	65	23	9	8	1	1	6	6	56	23	0	0	15	13
Edinburg.....	14	---	12	24	19	3	3	3	3	1	1	22	17	0	0	0	0
Pharr-San Juan-Alamo.....	44	---	32	57	33	11	10	3	3	6	6	28	21	0	0	13	12
Donna.....	16	---	7	25	8	3	3	2	2	1	1	34	11	0	0	3	3
Weslaco.....	18	---	13	112	34	5	5	0	0	6	6	25	19	0	0	1	1
Mercedes.....	23	---	15	49	22	2	2	1	1	4	4	25	18	0	0	5	4
La Feria.....	7	---	7	21	20	2	2	2	2	1	1	17	17	0	0	2	2
Raymondville.....	3	---	3	3	2	1	1	0	0	0	0	30	19	0	0	1	1
Harlingen.....	14	---	12	11	10	2	2	1	1	0	0	11	9	0	0	2	2
San Benito.....	6	---	5	26	11	1	1	2	2	1	1	23	14	0	0	1	1
Brownsville.....	2	---	2	3	3	0	0	1	1	0	0	1	1	0	0	0	0
Total.....	280	179	177	511	238	51	47	16	16	31	30	312	201	1	1	52	46

There was a considerable increase over the preceding year in the number of *A. serpentina*, *A. fraterculus*, and *A. pallens* taken in the traps. Only 1 specimen of *A. serpentina* and 2 of *A. fraterculus* were taken during the fiscal year 1932. So far as is known the species *X* and *Y* are new to science, whereas the *A. striata* was the first adult of this species taken in the continental United States. Whether these various species are feeding on citrus fruits, whether they have a native brush host, or whether they are a part of the northward migration of *Anastrepha* in Mexico is problematical. The specimens of *A. striata*, taken in the Mission district, undoubtedly drifted across the Rio Grande from Reynosa, Mexico, as guavas infested with this species are frequently observed in the Mexican markets. Papaya fruit flies (*Toxotrypana curvicauda* Gerst.), two specimens of which had previously been taken in the Weslaco district, were captured in fairly large numbers throughout the valley.

INSPECTIONS

The trapping operations planned as a supplement to the regular inspection of fruit for larval infestations proved so effective, through the use of the glass traps, that this phase of the work was given precedence in determining the extent of infestation for the year. Approximately 5,500 glass traps were in operation in the Texas groves from October 1933 to June 1934. A total of 245,615 inspections were made of these traps. An additional 3,500 glass traps were purchased near the end of the year, making a total of about 9,000 traps that will be in use during the next year.

In addition to the trapping operations, 12,358 regular grove inspections were made for the purpose of enforcing the regulations and locating larval infestations in the fruit. Intensive inspections were made of the fruit in those groves in which adult fruit flies were taken in the traps.

COLLECTION OF SPECIMENS

A total of 5,213 collections of specimens, comprising 7,089 adults and 18,823 larvae, were identified during the fiscal year. Of the adults, 1,343 and of the larvae 18,726 were fruit flies. Most of the collections of larvae were made in Matamoros, Mexico, from fruits shipped into that city from other parts of Mexico.

In an effort to determine, if possible, whether any of the native brush fruits were serving as hosts to any of the various species of *Anastrepha*, systematic collections of brush fruits were made and forwarded to the laboratory at Harlingen for pupation studies. A total of 700 such collections were made. A number of adults of *Zonosema* sp. emerged from collections of *Solanum* and two trypetid pupae were recovered from huisache beans.

FRUIT STERILIZATION NOT REQUIRED

The evidence of the trapping records indicated that adult fruit flies drifted considerably from grove to grove. Intensive inspections of fruit during the harvesting season in those groves in which adult fruit flies were taken gave negative results insofar as larvae of *A. ludens* were concerned, no fruit infested with such larvae being found until after the harvesting period had closed in the spring. As it cannot be stated definitely that the fruit in a grove in which adult fruit flies were taken was infested with larvae, it was not deemed advisable to declare infested zones, with the consequent requirements of sterilization or limited destination of the fruit. However, the growers and packers cooperated splendidly in seeing that practically all of the grapefruit from the groves in which adult fruit flies were taken was harvested immediately and shipped to northern markets outside the area in which the Mexican fruit fly is likely to be able to become established.

HOST-FREE PERIOD

Under an administrative order issued in July, the harvesting period for citrus fruits was extended 3 months, the opening and closing dates being September 1, 1933, and April 30, 1934, rather than October 1 and March 1, respectively. This extension was made necessary by the potential crop on the trees at the time, the harvesting of which would have been impracticable in the regular 5-month period. Two severe tropical hurricanes occurred on August 4 and September 4, however, and destroyed about 75 percent of the citrus crop of the year. The small crop left by the storms was practically harvested by the end of March, and in view of the considerable numbers of adult fruit flies taken in the traps during the winter months, it was deemed advisable to revoke the extension and close the harvesting season on April 5.

The better price offered by buyers for the relatively small amount of fruit left on the trees after the storms, caused the cutting crews and grove owners to make an exceptionally clean job of harvesting the marketable fruit in the groves. Very little "off-bloom" fruit was noticed in any of the orchards. In view of the unusual cleanliness of the groves, it was believed that the amount of money heretofore expended for labor in making a tree-to-tree inspection of the bearing trees of the valley could be more advantageously used in the purchase of additional glass traps. Accordingly, at the close of the harvesting period in the spring of 1934 the inspectors checked the groves of their respective districts closely enough to make sure that no more than an occasional fruit remained in the trees.

ELIMINATION OF ALTERNATE HOST-FRUIT TREES

During the year, 330 alternate host-fruit trees, including 254 guava, 62 peach, 6 plum, 4 apple, 3 sapote, and 1 pear, died or were dug up. A number of these were old trees that had died of root rot or from the effects of the hurricanes referred to above. The remainder were mostly seedlings, which were dug out with the owners' permission. A total of 40,623 alternate host-fruit trees have been destroyed during the past 6 years.

POISON SPRAY

Experience gained in the four valley-wide applications of nicotine-molasses spray during the fiscal year 1933 showed that a complete coverage of the larger trees with the spray was an impossibility with the knapsack sprayers. It was believed that the complete coverage obtainable with a power sprayer in groves

in which the use of the glass traps showed infestation would be more effective as an eradication measure than the more or less spot spraying of all the bearing trees with the hand sprayers. After the trapping of adult Mexican fruit flies in December a three-way agreement was therefore entered into, whereby Cameron and Hidalgo Counties each purchased a small power sprayer, the Bureau supplied the material for the spray and the automobile chassis on which to mount the sprayers, and the State of Texas furnished the labor for the application. These sprayers were small enough to be driven between closely planted trees, yet developed sufficient power to allow the application of the poison to the tops of the highest trees. As an additional precaution, the bearing trees within a considerable zone around several of the most heavily infested areas were given an application of the spray. Details of the spraying activities are given in table 9. The proportions of nicotine and molasses used were the same as those reported last year.

TABLE 9.—*Summary of spraying operations, fiscal year 1934*

Month	Trees sprayed	Premises sprayed	Material used	
			Nicotine	Molasses
	<i>Number</i>	<i>Number</i>	<i>Gallons</i>	<i>Gallons</i>
January.....	4,668	13	20	392
February.....	13,615	34	59	1,367
March.....	13,489	28	67	1,357
April.....	24,838	71	121	2,433
May.....	32,542	69	122	2,427
June.....	6,505	28	30	605
Total.....	95,657	243	419	8,581

CERTIFICATION OF FRUIT

Prior to the tropical hurricanes that struck the valley in August and September the potential crop had been estimated at 16,000 carloads of citrus fruit. Despite the loss occasioned by these storms, total shipments equivalent to 4,091 carloads were certified during the season, which was only 570 carloads less than quantities shipped during the preceding season.

Of particular interest is the fact that 53 percent of the crop was shipped by truck, as compared to 44 percent shipped by rail and 3 percent by express. This was the first season that the truck shipments exceeded those by rail. About 92 percent of the entire orange crop of 984 carloads was handled by the truckers. Although the majority of the truck shipments were destined for points in Texas and were certified under the Texas regulations, 2,431 Federal master permits were issued for shipments by road vehicles to 21 States and the District of Columbia.

In order to relieve the district inspectors of the onerous burden of issuing permits for the large number of trucks loaded on holidays and after 5 p. m., the office at Edinburg, the gateway of the valley, was kept open on holidays and from 5 p. m. to 1 a. m., for the purpose of supplying permits for truck loads of fruit originating in the various packing plants of the valley. Loads not clearing through a packing house were required to be covered by permits issued by the inspector in the district in which the grove of origin was located.

ROAD-TRAFFIC INSPECTION

The road-traffic-inspection station on the main highway leaving the lower Rio Grande Valley was operated from September to the close of the harvesting period on April 5. As no limited destination or fruit-sterilization requirements were in effect owing to the absence of any known larval infestation during the harvesting period, inspections were confined to commercial loads moving by truck, and passenger automobiles were allowed to proceed without checking as to the presence of fruit. As will be seen from table 10, a total of 10,934 truck loads of fruit were checked by the station during the time it was in operation. During the height of the shipping season an average of 75 fruit trucks passed the station daily.

TABLE 10.—Road-traffic inspection, fiscal year 1934

Month	Trucks inspected		Fruit passed, packed in boxes and baskets						Fruit passed in sacks		Fruit re- turned to area	Fruit con- fis- cated
	Passed	Not passed	Grapefruit		Oranges		Total					
	<i>Num- ber</i>	<i>Num- ber</i>	<i>Boxes</i>	<i>Bush- els</i>	<i>Boxes</i>	<i>Bush- els</i>	<i>Bores</i>	<i>Bushels</i>	<i>Num- ber</i>	<i>Pounds</i>	<i>Bush- els</i>	<i>Bush- els</i>
September	529	0	6, 175	40, 181	76	6, 048	6, 251	46, 229	207	15, 240		
October	573	0	5, 632	34, 346	109	15, 194	5, 741	49, 540	62	4, 960		
November	1, 262	7	14, 779	66, 404	333	48, 205	15, 112	114, 609	56	3, 120		
December	1, 958	5	13, 410	86, 199	3, 669	100, 168	17, 079	186, 367	529	30, 660		
January	2, 132	2	13, 474	116, 261	4, 170	92, 365	17, 644	208, 626	352	26, 290		
February	2, 118	6	14, 843	108, 610	2, 838	89, 529	17, 681	198, 139	1, 757	98, 740	192	16
March	2, 118	4	11, 859	92, 004	5, 201	93, 456	17, 060	185, 460	3, 241	229, 585	38	11
April	244	1	1, 247	8, 777	883	8, 475	2, 130	17, 252	388	26, 280		11
Total	10, 934	25	81, 419	552, 782	17, 279	453, 440	98, 698	1, 006, 222	6, 592	434, 875	230	38

Two State laws, the Fruit Standardization Act and the Maturity Act, were in effect during the season, requiring the checking of trucks moving over the highway for the enforcement of their provisions. Arrangements were made, therefore, to have the inspectors at the road station enforce the regulations of the three organizations concerned.

No reports were received of fruit trucks using the ranch roads to the northwest in leaving the valley, and therefore no patrols were placed on these roads.

CENSUS OF FRUIT TREES

In order to know the number of trees over which it is necessary to maintain supervision, a census is made each spring of the growing trees in the quarantined area. On account of the large number of trees killed by the storm of September 4, a particularly close check was made of the trees this spring. The corrected figures show that there are in orchard form 8,201,211 citrus trees in the lower Rio Grande Valley in Texas, 203,529 fewer than were in orchard form on April 1, 1933. The storm killed 580,419 trees, but this loss was partially offset by the planting of 376,890 trees during the period April 1, 1933, to March 31, 1934. The figures given above do not include the dead trees or the resets in groves in which only an occasional tree was lost, nor do they include 176,812 trees classified as noncommercial. The mortality among the trees will undoubtedly continue for some time.

VIOLATIONS

The usual minor infractions of the regulations were encountered and corrected during the year. Five reports from the transit inspectors of small shipments of fruit in violation of the regulations of the Mexican fruit fly quarantine were received and investigated. One attempt to smuggle storm-blown fruit by the road station was apprehended but, in view of the circumstances surrounding the case, the offender was released with a reprimand after being required to bury the contraband fruit. The nearest approach to a willful violation of the quarantine was the case of the owner of about an acre of trees in the Lyford community. This grower refused at the opening of the host-free period to remove from his trees a small amount of ripe and off-bloom fruit. He was finally prevailed upon to allow the State inspectors to clean the trees.

INFESTATIONS IN MEXICAN TOWNS ALONG THE BORDER

The control work on the Mexican side of the Rio Grande was expanded during the year to include regular trapping operations in Reynosa, across from McAllen, Tex., and in a number of ranches scattered along the river from Matamoros to Rio Rico. A number of traps were operated for a short time in Nuevo Laredo, across from Laredo, Tex. Matamoros continued to be the center of control operations, as it received far more fruit from fly-infested districts of Mexico than any town directly across the Rio Grande from the citrus-growing area of Texas.

A total of 18,636 specimens of *Anastrepha* were taken on the Mexican side of the Rio Grande during the fiscal year. Adult *A. ludens* were trapped in Matamoros, Reynosa, and Nuevo Laredo; *A. serpentina*, *A. striata*, and *A. pallens* in Matamoros; and *A. fraterculus* in Reynosa. The *A. serpentina*, *A. striata*, and *A. fraterculus* were the first adults of these species to be trapped in the Mexican border towns since the work has been in progress.

All larvae were recovered in Matamoros. Of the imported fruits, mangoes continued to be most heavily infested, 10,669 larvae of *A. ludens* being taken from this fruit in June alone. The number of larvae of *A. ludens* taken from imported oranges showed an increase over previous years. Larvae of *A. striata* were taken from guavas. *A. serpentina* was taken from peaches, and in all probability from apples, mameys, and quinces, the characters of the larvae from these latter fruits being very similar to those of the larvae from peaches. The determination of larvae from peaches originating in Ramos Arizpe, Coahuila, Mexico, as *A. serpentina*, was made by the Mexican inspector in Matamoros by rearing adults from the infested fruit. This established a new host for this species in Mexico and also a new locality infestation. A number of *Anastrepha* larvae definitely determined as not being *ludens* were taken from Manila mangoes shipped to Matamoros from Vera Cruz.

Inspection of local fruit in Matamoros in July resulted in the taking of 121 larvae of *A. ludens* in sour oranges on 2 premises. The trees on these premises were stripped of all fruit and sprayed with a mixture of nicotine and molasses. The nicotine-molasses spray was also applied to the trees on the 24 premises on which 81 adult *A. ludens* were taken during the year. No fruit in stages susceptible to larval infestation was available subsequent to the September hurricane.

The danger of reinfestation of Texas groves by infested fruit reaching Mexican border towns is exemplified by the taking of an adult *A. ludens* in a trap in the brush on the banks of the Rio Grande directly across from Reynosa; by the taking of several adult flies in the village of Hidalgo, also across the river from Reynosa; and by the taking of an adult *A. striata* in the Mission district. These findings undoubtedly originated in infested fruit shipped to Reynosa. The details of the fruit-fly findings in the Mexican towns along the border are shown in table 11.

TABLE 11.—*Infestations of Anastrepha in Mexican border towns, fiscal year 1934*

Month	Local fruit					Larvae found in imported fruit—								Pupae found in imported fruit	Total	
	Adults trapped					Larvae found in sour orange	Apple	Guava	Mango	Mamey	Orange	Peach	Quince			Unknown ¹
	<i>A. ludens</i>	<i>A. serpentina</i>	<i>A. pallens</i>	<i>A. striata</i>	<i>A. fraterculus</i>											
July.....	27	1				121		² 407				³ 11				567
August.....			1				³ 5		9		1	¹ 123	³ 56			195
September.....																0
October.....											155					155
November.....	1							² 1			560					562
December.....	5							² 2			119				1	127
January.....	5							² 6		³ 16	4					31
February.....	2				1			² 15			14					32
March.....	3		1	1					18							23
April.....	2		1						500		15					518
May.....	2								10,669		156			255	1	11,083
June.....	36								4,201		52	³ 4		1,050		5,343
Total.....	83	1	3	1	1	121	5	431	15,397	16	1,076	138	56	1,305	2	18,636

¹ Specimens taken from box in which fruit was carried from market to office.

² *A. striata*.

³ Probably *A. serpentina*.

DATE SCALE ERADICATION

Inspection and clean-up work was continued in the date-growing areas of Arizona and California. Inspection from ladders was discontinued in some areas, only offshoots and such foliage as could be reached from the ground being examined. Many plantings were given their final inspections and are considered free from *Parlatoria* date scale (*Parlatoria blanchardi* Targ.). Certain areas were rescouted to locate unlisted palms. Checking previously cleaned areas for volunteer plants was also continued. The details are given in table 12.

TABLE 12.—*Palm inspection and treatment, date-scale eradication project, fiscal year 1934*

Item	Arizona		California		Total
	Phoenix district	Yuma district	Coachella Valley district	Imperial Valley district	
Palm inspections.....	59,764	2,172	203,841	27,695	293,472
New infested properties.....	0	0	0	0	0
Total infested properties.....	0	0	0	1	1
Date palms infested.....	0	0	0	11	11
Other palms infested.....	0	0	0	0	0
Total.....	0	0	0	11	11
Treatment:					
Defoliated and sprayed.....	0	0	0	10	10
No treatment (dead scale).....	0	0	0	1	1
Total.....	0	0	0	11	11
Valueless palms dug out in infested areas; not included above.....	10	0	605	9	624

COACHELLA VALLEY

During the year 203,841 palm inspections were made in the Coachella Valley and no *Parlatoria* scale was found. This is the second successive year since the beginning of the project that no scale has been found in that district, and the third successive year in which no new infestation has been found. Many volunteer plants growing from seed and parts of stumps in previously cleaned plantings were destroyed, and 605 valueless palms in the infested area were dug out. Several hundred palms were pruned to facilitate inspection, and 50 were stripped of fiber in order than the leaf bases might be examined. A total of 8,847 offshoots were inspected for movement.

IMPERIAL VALLEY

In the Imperial Valley, 27,695 palm inspections were made during the year. Eleven infested date palms were found on 1 property, an old infestation, as compared with 2 infested date palms and 5 infested Canary Island palms on 4 properties in 1933. While, as indicated, the infested property represents an old infestation, the original infestation had apparently been cleaned up, and the present infestation probably came from an outside source. One rather heavily infested palm was found in July, and the other 10, very lightly infested, were found during the period September to May. These 10 palms were grouped closely around the palm found in July, and the infestation on them undoubtedly resulted from spread from the latter.

Careful rescouting was carried on in 134¾ sections to locate unlisted palms.

PHOENIX DISTRICT

In the Salt River Valley of Arizona, 59,764 palm inspections were made, and no scale was found. Only 1 infested palm has been found in Arizona in the past 3 years. All palms on previously infested properties were pruned where necessary for close inspection, and 10 were dug out and destroyed. Leaf bases were removed from all but 2 previously infested palms. Rescouting for unlisted palms was carried on in certain areas.

YUMA DISTRICT

In the city of Yuma and vicinity, 2,172 palm inspections were made, and leaf bases were removed from 14 previously infested palms. No *Parlatoria* scale has been found in the Yuma district for the past 3 years.

QUARANTINE ON DOMESTIC NARCISSUS

In the absence of a Federal appropriation for the enforcement of the narcissus bulb quarantine, the inspection required as a condition of interstate movement has been carried out by the nursery-inspection organizations of the various States. Prior to this fiscal year, the Federal Department was able to assign temporarily a few men employed on other projects to aid the States in such inspections when the State officers so desired. The retrenchment program in the Department forced the Bureau, beginning in 1933, to discontinue such assistance, and for the fiscal year here reported, therefore, inspections and certifications have been made entirely by State forces. A number of the State organizations are also carrying on their work with greatly reduced funds and have notified the Department that it is becoming difficult if not impossible for them to carry out the necessary narcissus inspections.

The nursery inspectors of the various States reported that during the summer and fall of 1933, they had made inspections of 305,875,898 bulbs of all types, an increase of about 1 percent over the number reported the previous year. About 59 percent of the bulbs inspected in 1933 were Paper White and other polyanthus varieties commonly grown in the South, a larger percentage than in 1932; and about 41 percent were of the daffodil type produced in the Northern States, a smaller percentage than in 1932.

Of the bulbs inspected, 228,978,135 were certified as uninfested; 18,578,820 were fumigated with cyanide and certified, and 15,291,197 were treated with hot water and certified after treatment. In some cases the fumigation or hot-water treatment was precautionary and therefore did not necessarily represent infestation in the stock concerned. This is especially true with respect to fumigation in several of the leading daffodil-growing sections of the country where fumigation with calcium cyanide dust constitutes routine practice, owing to the general and scattered establishment of the narcissus bulb fly. The numbers of bulbs certified indicate the supplies available for shipment so far as adequate inspection and freedom from pests are concerned. The greater proportion of such bulbs, however, are replanted by the growers, who estimate that only from 20 to 30 percent of the bulbs are involved in interstate commerce during any one year.

Infestations with the bulb eelworm (*Anguillulina dipsaci*, formerly called *Tylenchus dipsaci*) were reported in 1933 in one or more plantings in each of the following States: California, Florida, Georgia, Illinois, Maryland, Michigan, Missouri, New Jersey, New York, North Carolina, Ohio, Oregon, Tennessee, Virginia, and Washington. In addition to the States reporting it in 1933, this species had previously been reported as occurring in Alabama, Indiana, Kansas, Kentucky, Mississippi, Rhode Island, Utah, and Wisconsin. Some of these properties on which bulb eelworms were found have not since been reported as inspected, and infestation may possibly still be persisting in some of them.

Greater bulb flies were again reported in California, Michigan, New York, North Carolina, Ohio, Oregon, Pennsylvania, and Washington. They have also been found in previous years in Illinois, Rhode Island, Utah, and Virginia.

BLACK STEM RUST QUARANTINE

Under the black stem rust control program, the Department is cooperating with 13 grain-growing States of the Middle West in the destruction of those kinds of barberries that spread the rust to grainfields. The barberry quarantine was established to prevent the shipment of susceptible barberries into those States. Under its provisions, nurserymen who grow only rust-resistant species are issued permits under which such resistant species may be shipped into the protected States. Such permits are required for the shipment into the 13 States concerned of all kinds of barberry and mahonia plants except the Japanese barberry (*Berberis thunbergii*), which is immune to rust infection.

At the present time some 26 species of *Berberis* and *Mahonia* plants are known to be either entirely immune to black stem rust or so resistant that they could not be a factor in the spread of the rust. More than 100 species and varieties are susceptible to black stem rust attack. These species cannot be shipped into the protected States. In addition to these groups, about 17 species and varieties are

still under test, and until their reactions are more fully known, their transportation into the barberry-eradication area is not being authorized.

In enforcing the quarantine, the Department sends a specialist to go over the premises of applicants to be sure that the kinds of barberries grown are limited to the resistant types. If susceptible plants are found, a permit is refused, while if no barberries except the resistant kinds are grown, a general permit is issued, and the nurseryman is supplied with shipping tags which authorize the transportation of the resistant barberry and mahonia plants to the protected States.

During the shipping season of 1933-34, 23 nurserymen held permits for the shipment of resistant species. Nine of these nurseries were located in Ohio, and the others in Colorado, Illinois, Indiana, Kansas, Michigan, New Jersey, Pennsylvania, Virginia, and Washington.

In finding and destroying the barberries that have been planted or are growing in the woods and fields in the protected States, these States are cooperating with the Bureau of Entomology of this Department. According to that Bureau, 441,902 barberry bushes, seedlings, and sprouts were destroyed in these 13 States during the calendar year 1933, a total of 19,107,305 having been destroyed since the campaign was started in the spring of 1918. The States in which this work is being carried on are Colorado, Illinois, Indiana, Iowa, Michigan, Minnesota, Montana, Nebraska, North Dakota, Ohio, South Dakota, Wisconsin, and Wyoming.

During the fiscal year 28 violations of the barberry quarantine regulations were intercepted by transit inspectors and returned to the sender.

PREVENTION OF SPREAD OF PHONY PEACH DISEASE

Following the revocation of the Federal phony peach disease quarantine, effective March 1, 1933, the responsibility for the control of the movement of those classes of nursery stock known to be susceptible to the phony peach disease reverted to the States. As was announced in the last annual report, the Department has since been cooperating with the States in increasing the efficiency of the inspection of peach-growing nurseries and their environs by directly aiding in such surveys and in assisting the States in the development and adoption of improved culling practices to eliminate all borer-infested and borer-injured stock.

Conferences of State plant quarantine officers were held in the spring of 1933 to decide on the most desirable type of State regulations to be put into effect after the Federal quarantine was revoked. As a result of these conferences, regulations relating to the prevention of the spread of the phony peach disease have been issued by the States of Alabama, Arkansas, Delaware, Georgia, Louisiana, Mississippi, Oklahoma, South Carolina, Tennessee, and Texas. Most of them provide that peach stock be accepted for shipment or sale either (1) if the environs of the nursery are free from the phony peach disease for a distance of 1 mile, or (2) if the peach nursery stock is inspected tree by tree at digging time by State or Federal inspectors and all trees found infested by the peach borer are culled out and destroyed.

Since preliminary evidence obtained by the Bureau of Plant Industry indicates that the peach borer is probably the carrier of phony peach disease from diseased to healthy trees, consideration was at first given to the possibility of culling out all peach nursery stock in the infected States to eliminate all borer-infested and borer-injured trees. It was found, however, that most of the nurseries concerned usually dig their stock at irregular periods during the fall and winter months, and do not have large quantities available for inspection at any one time. This situation would make it physically impossible, with the limited number of inspectors available, to inspect tree by tree all peach-rooted nursery stock grown throughout the entire phony peach infected area. It was found much more economical and efficient to inspect, during the growing period, the environs of peach plantings for a radius of 1 mile, and then to release the stock growing in those nurseries within 1 mile of which no phony peach disease was found. This environs inspection also has a definite value from the standpoint both of finding the areas in various States which the phony peach disease has reached and in accomplishing the local eradication of the disease around nurseries, and thus furthering the general project of its ultimate complete extermination.

During the summer of 1933 the Bureau of Plant Quarantine, at the request of the State officers concerned, cooperated in making inspections for the phony peach disease around the peach-growing nurseries of Alabama, Georgia, Illinois, Louisiana, Mississippi, Oklahoma, South Carolina, Tennessee, and Texas.

As will be seen from table 13, the work involved covering the environs of the peach plantings of 139 nurseries growing an estimated total of 3,944,994 peach

trees and other trees budded on peach roots which were intended for movement during the season of 1933-34. The environs of 96 nurseries were found to be apparently free from infection for a radius of 1 mile. The disease was found within that distance of one or more plantings of the other 43 nurseries inspected. In Arkansas, Florida, Missouri, and North Carolina, the work was carried out entirely by the State nursery-inspection organizations, and in the absence of a detailed report from the State inspectors, the work in these States is not included in the table. In addition to the figures shown, the Illinois inspectors covered the environs of 2 nurseries without finding phony peach disease within the area; and those of Georgia covered the environs of 5 nurseries, and in each case found the phony peach disease within the area.

TABLE 13.—*Nurseries growing peach and nectarine trees inspected by Federal and State inspectors in cooperation to determine the presence or absence of phony peach disease in the vicinity*

State	Nurseries				Nursery trees		Total trees in inspected nurseries
	Without phony disease within 1 mile	With phony disease within 1 mile of all blocks ¹	With phony disease within 1 mile of some blocks only ¹	Total inspections	In blocks not exposed ²	In exposed blocks ²	
Alabama.....	4	6	1	11	256, 700	191, 875	448, 575
Georgia.....	9	8	1	18	147, 126	² 168, 274	315, 400
Illinois.....	10	-----	-----	10	² 323, 000	-----	323, 000
Louisiana.....	1	-----	-----	1	20, 100	-----	20, 100
Mississippi.....	1	3	-----	4	1, 000	6, 050	7, 050
Oklahoma.....	12	-----	-----	12	² 142, 859	-----	142, 859
South Carolina.....	2	-----	-----	2	33, 300	-----	33, 300
Tennessee.....	25	1	1	27	² 1,508, 756	129, 219	1, 637, 975
Texas.....	32	20	2	54	² 691, 073	325, 662	1, 016, 735
Total.....	96	38	5	139	-----	-----	3, 944, 994

¹ Peach stock in the exposed nurseries was later called free from borer-injured trees under State and Federal supervision except that in Alabama the work was practically all done by State inspectors and in Mississippi much of the exposed stock happened to be unsalable for other reasons.

² No information was received as to the amount of stock in 2 nurseries in Georgia, 3 in Illinois, 2 in Oklahoma, 1 in Tennessee, and 2 in Texas. None of these except the 2 in Georgia, had been exposed to infection.

During the digging and shipping season, the Bureau received requests from the States of Alabama, Georgia, Tennessee, and Texas for assistance in improving the efficiency of culling susceptible nursery stock. In this work the State and Federal inspectors endeavor to find the most positive and definite ways of determining borer infestation and injury. In addition to the peach trees so culled, small quantities of flowering peach and of plum and apricot trees budded on peach roots were also examined. The fruiting-type peach trees included stock of the four principal nursery classifications, namely, June buds, dormant buds, year-old June buds, and carried-over dormant buds. The term "June buds" refers to seedling trees that are budded in June so that the resulting nursery stock is ready for sale the same fall or the following spring, and the term "dormant buds" refers to nursery stock that is not budded until the late summer and fall so that the trees are not ready for sale until the following year. The other two groups include trees which are 1 or more years older than the June buds or dormant buds.

Of special interest in this connection is the fact that peach-borer-infested and borer-injured trees were found in each of the four classifications as well as in the plum, apricot, and flowering peach trees budded on peach roots. It had not previously been certain that trees as small as June buds were attacked under field conditions in commercial nurseries. June-bud stock is exposed to infestation during only one season, and throughout a large part of the peach borer egg-laying period the small trees have very little top growth. Either the trees are so small that they are not attractive to the borer moths when the eggs are laid or possibly the absence of shade results in an unusually high mortality of the eggs and young borers through drying. In those cases where detailed notes were taken, the average number of June buds infested or injured amounted to 1.9

percent. The maximum percentage of infestation found in June buds was 3.77 percent. In dormant budded stock the degree of infestation varied from 4.14 percent to 42.79 percent. In the older nursery trees the average degree of infestation amounted to 47.71 percent; the maximum infestation noted in any single lot was 85.84 percent. A considerable variation was noted in the degree of infestation between different nurseries in the same locality and even in different parts of the same field. These differences are correlated with several kinds of local conditions, including the number of years the peach nursery stock has been grown in the field concerned, the proximity of neglected peach trees in home orchards in the neighborhood, and similar factors. In addition they seem to be correlated somewhat with the types of soil and the slope of the field, higher percentages of infestation appearing in trees grown in soil that holds moisture for long periods.

Particular attention was given to accurate methods of separating the trees on which borers had fed but which were no longer infested, from trees which were mechanically injured or bruised. It is important from the standpoint of prevention of spread that no borer-injured trees be passed. From the nurseryman's standpoint it is equally important to avoid condemning trees that have been subject only to slight mechanical injury. It was found that by observing the nature of the exuding gum and the types of markings, a high degree of efficiency in making such determinations can be reached, but further study is needed along these lines. In this work it is necessary to handle each nursery tree separately, and the work therefore cannot be done as rapidly as some other types of nursery inspection.

WOODGATE RUST QUARANTINE

No spread of the Woodgate rust, a disease which attacks Scotch and other hard pines, was reported outside the 10 counties in northern New York already known to be infected, and no violations of the quarantine have been intercepted.

WHITE PINE BLISTER RUST QUARANTINE ENFORCEMENT

The number of nurseries growing white pine whose plantings are protected against blister rust infection by the eradication of currant and gooseberry plants around them has been greatly increased during the past year. The change has been due partly to a revision of the blister rust quarantine regulations which became effective January 1, 1933, and which greatly extended the area into which protected white pines might be shipped from the infected States. Other important factors in the increased number of white pines produced, however, have been the recent impetus to reforestation in general and also the fear of nurserymen that the red pine, which has been extensively planted, may be seriously injured for reforestation as well as for ornamental purposes by the attack of the European pine shoot moth. Under the Federal laws, the Forest Service has not only purchased large quantities of forest-planting stock but has established a number of new nurseries which are expected to have a large annual output of seedlings and transplants. Among the forest trees grown in these nurseries, about 20,000,000 white pines will probably be produced. All such Forest Service nurseries producing white pines are being protected against the establishment of blister rust by means of the destruction of currant and gooseberry plants in and around their premises.

For the shipping season of 1933-34, the Bureau received applications for pine-shipment permits covering 37 nurseries in 10 States. These were scattered from Maine to Iowa and as far south as Virginia, in addition to 1 each in Idaho and Montana. Such applications are referred to the Division of Blister Rust Control, heretofore in the Bureau of Plant Industry, and the currant and gooseberry eradication in the sanitation zone is carried on under the direction of that Division in cooperation with State officials and nursery owners. This eradication involves finding and destroying all the currant and gooseberry plants within a zone 1,500 feet in width around the areas growing white pine, and all European black currant plants within a similar zone 1 mile in width. Authority for the destruction of wild or cultivated currant and gooseberry plants is provided in some States by law or regulation, while in other States the eradication is carried out entirely on a basis of cooperation between the nurserymen and the private owners concerned.

In the upper Mississippi Valley, the Lake States, the New England States, and the Pacific Northwest, currant and gooseberry destruction around nursery premises is often a difficult and expensive undertaking, owing to the fact that

such plants grow wild often in practically all types of land except that under frequent cultivation. Under favorable moisture and soil conditions they sprout readily from broken root stocks, and seedlings often come up in numbers from seed produced from 1 to a number of years previously. In these sections, wild currant and gooseberry plants are so persistent that the sanitation zone must be thoroughly covered each year in order to protect the pines. In Virginia and Maryland, on the other hand, currant and gooseberry plants have not been found to be growing wild in the nursery sections except in one instance in which a few native black currant plants were located, and the work has therefore involved little or no expense to the nursery owners.

In the nursery-protection work, it is necessary to attain a very high degree of efficiency in currant and gooseberry eradication. Experience has shown that the presence of a very few plants within the 1,500-foot zone is likely to result in infection being carried to the white pine seed or transplant beds. It is therefore necessary that eradication crews work and rework the 1,500-foot zone until they are thoroughly convinced that the last currant or gooseberry plant has been detected and destroyed.

After the annual inspections of nurseries and the environs were made it was found possible to issue shipping permits for 22 premises, of which 4 are operated by Federal or State Governments and 18 by private individuals or corporations. Twelve of the applications for permits were withdrawn or disapproved for the reason either that blister rust infection was found, or that currant or gooseberry plants were so prevalent as to endanger the pines, and the applications of three nurseries in which the pines had not reached a salable size were tentatively approved. Of the commercial concerns, those whose applications were approved reported that they were growing 243,150 white pines and those whose applications were denied reported a total of 212,150 such pines. The four permittees whose nurseries are operated by the Federal or State Governments were growing 13,800,000 white pines.

During the fiscal year 56 violations of the white pine blister rust quarantine regulations were intercepted by transit inspectors and returned to the sender. In one case, blister rust infection was found and the infected twigs and branches destroyed.

TRANSIT INSPECTION

Transit inspection is the principal method used by the Department in insuring compliance with domestic plant quarantines so far as mail, express, and freight shipments are concerned. The inspectors under this project are stationed at the principal railroad-transfer points in various sections of the country, and at these points they check shipments of plants and other restricted articles to be sure that they comply with the Federal plant-quarantine requirements to prevent the spread of pests from infested to uninfested sections of the country.

This work is carried out in cooperation with the States in which such transfer points are located, and with the hearty assistance and support of the employees of the Post Office Department and the railway and express companies.

With the development of additional types of common-carrier movement, particularly airplanes and automobile-truck lines, the work has been extended where possible to the checking of such shipments also. No road stations are maintained under this project, but freight movement by way of interstate trucking lines which have regular stations in the principal cities are being checked to a limited extent.

Parcels moving by air mail and express are in most cases inspected at the post office and express platforms in the regular routine. In Chicago it has been found practicable to visit the airport regularly during certain seasons. In carrying out this plan during the past fiscal year, 82 shipments moving by air mail and 961 moving by air express were inspected. One quarantine violation was intercepted during such inspections. It consisted of cut flowers being shipped during the summer from the Japanese beetle-infested area of New Jersey to a point in Nevada without having been inspected previously and certified as free from the Japanese beetle.

The procedure of checking shipments to determine compliance with domestic plant quarantines has recently been considerably simplified by the publication of Miscellaneous Publication 189, A Synopsis of Federal Plant Quarantines Affecting Interstate Shipments in Effect January 1, 1934. This synopsis, in addition to outlining the quarantine requirements, gives the quarantines affecting shipments from and to each individual post office of the United States. The publication has been in considerable demand from shippers and the employees of transportation agencies as well as from various nursery inspectors and plant quarantine officers throughout the United States.

The results of the work are summarized in tables 14 and 15. It will be noted that 1,043,687 shipments were checked at 23 points. The list of stations given in table 14 includes not only those where inspectors are employed regularly under the transit inspection project, but also those maintained cooperatively with the States and with other projects of the Bureau. The number of shipments found moving in violation of quarantine regulations totaled 1,680. In practically all cases these were returned to the shipper with information as to the quarantine requirements applying to the shipment concerned.

TABLE 14.—*Shipments of nursery stock and other plants and plant products inspected in transit during the fiscal year 1934*

Station	Shipments				Car-loads
	Parcel post	Express	Freight	Total	
Albany, N. Y.	721	508	1,516	2,745	-----
Boston	26,204	38,302	17,822	82,328	15
Chicago	138,365	20,072	1,425	159,862	199
Cleveland	2,354	6,770	1,095	10,219	-----
Detroit	7,297	2,979	1,502	11,778	158
Indianapolis	6,581	11,140	2,507	20,228	-----
Jacksonville, Fla.	9,084	25,880	22,546	57,510	-----
Kansas City	32,081	6,920	317	39,318	-----
Mechanicville, N. Y.	-----	-----	1,712	1,712	-----
New Haven	-----	-----	875	875	-----
New York	132,165	25,383	817	158,365	112
Omaha and Council Bluffs	20,529	2,824	2,117	25,470	-----
Philadelphia	146,936	68,388	17,787	233,111	175
Pittsburgh	63,333	19,692	1,640	84,665	6
Portland, Oreg.	25,244	6,618	3,754	35,616	-----
St. Louis	51	42	-----	93	-----
St. Paul and Minneapolis	28,768	4,497	2,799	36,064	1
Seattle	22,299	5,865	459	28,623	-----
Spokane	38,731	4,724	567	44,022	4
Washington, D. C., and Alexandria, Va.	4,423	4,828	1,832	11,083	3
Total	705,166	255,432	83,089	1,043,687	673

TABLE 15.—*Summary of shipments of nursery stock and other articles intercepted in violation of Federal plant quarantines ¹ at transit inspection points, fiscal year 1934*

Station	Number of shipments intercepted in violation of quarantine—									Total
	No. 6	No. 38	No. 45	No. 48	No. 52	No. 53	No. 62	No. 63	No. 64	
Albany, N. Y.	-----	-----	-----	1	-----	-----	-----	-----	-----	1
Boston	-----	-----	118	216	-----	4	3	2	-----	343
Chicago	-----	11	10	83	2	3	124	12	1	246
Cleveland	-----	-----	2	3	-----	-----	-----	-----	-----	5
Detroit	-----	-----	3	5	-----	-----	-----	-----	-----	8
Indianapolis	-----	-----	-----	9	-----	-----	-----	-----	-----	9
Jacksonville, Fla.	-----	-----	5	53	1	-----	7	1	-----	67
Kansas City	1	-----	4	30	-----	-----	27	6	1	69
New Haven	-----	-----	6	2	-----	-----	-----	-----	-----	8
New York	-----	-----	72	294	-----	9	28	6	-----	409
Omaha and Council Bluffs	-----	1	2	26	-----	-----	46	9	-----	84
Philadelphia	-----	-----	39	205	-----	2	6	2	-----	254
Pittsburgh	-----	-----	-----	49	-----	-----	10	-----	1	60
Portland, Oreg.	-----	-----	-----	-----	-----	1	20	8	-----	29
St. Paul and Minneapolis	-----	2	1	4	-----	-----	4	1	1	13
Seattle	-----	11	-----	1	-----	4	11	5	-----	32
Spokane	-----	3	-----	-----	-----	-----	2	3	-----	8
Washington, D. C., and Alexandria, Va.	-----	-----	1	27	-----	-----	6	1	-----	35
Total	1	28	263	1,008	3	23	294	56	4	² 1,680
Commercial	-----	8	133	539	1	8	230	31	1	951
Noncommercial	1	20	130	469	2	15	64	25	3	729

¹ Quarantine no. 6 relates to date palm scales; no. 38, to black stem rust; no. 45, to the gypsy moth and brown-tail moth; no. 48, to the Japanese beetle; no. 52, to the pink bollworm; no. 53, to the satin moth; no. 62, to narcissus pests; no. 63, to the white pine blister rust; and no. 64, to the Mexican fruit worm.

² The total number of quarantine violations represents 1,593 shipments, of which 83 were in violation of 2 quarantines, and 2 were in violation of 3 quarantines.

The value of maintaining a transit-inspection program cannot be measured by the number of interceptions alone, as commercial shippers are well informed concerning the transit-inspection work and consequently make every attempt to comply with the quarantine regulations and avoid the interception and return of their shipments. Experience has shown that when the shipments of restricted articles out of any quarantined area are not checked regularly, shippers become careless, and pests may be distributed to new localities as a result.

In connection with cooperation with the States, the transit inspectors report to the State authorities shipments observed moving in violation of State quarantine requirements, although in the absence of statutory authority, such shipments are not intercepted and returned. Similar reports are made to State officials, as well as to the Post Office Department, with respect to parcel-post shipments of plant materials which do not bear a valid State nursery-inspection certificate in accordance with postal laws and regulations and State nursery-inspection requirements. Express and freight shipments which are not properly certified are also reported to the State officials. As a result of several years of this cooperative type of work it is noted that there has been a decided decrease in the numbers of noncertified or improperly certified shipments observed moving through transit-inspection points.

In addition to the work outlined, the transit-inspection organization has been engaged from time to time in related activities at destination markets. Among these have been the supervision of sterilization of fruit exposed to fruit-fly infestation where the fruit concerned is shipped to destination markets and treated there rather than at the point of origin. During the season when freight trains are particularly likely to be responsible for transporting Japanese beetles to new localities, the cleaning of refrigerator cars that have come from infested areas has been supervised by the transit inspectors, who have also seen to the destruction of the refuse. Japanese beetles also are sometimes carried with nonagricultural freight or unrestricted articles, such as potatoes, where their association with the product is entirely incidental, due to the clinging of the beetles to the outside of the sacks, and as far as time permitted, the transit inspectors have checked on products of this kind from infested areas.

In addition to the information given in table 14, 16,000 pounds of freight were inspected at Boston, and 60,311 pounds at Chicago. At Jacksonville, Fla., 650,287 waybills and 247,371 car lots were checked to determine whether the shipments might need to be inspected for compliance with plant-quarantine regulations. At Chicago similar information was secured through telephone calls and the checking of waybills covering 13,710 freight shipments weighing 4,137,185 pounds; and 175 empty cars from the area regulated under the Japanese beetle quarantine were inspected at that point to determine whether they had been cleaned sufficiently to free them from Japanese beetles.

In addition to the figures shown in table 15, the transit inspectors intercepted 84 shipments moving intrastate in violation of State quarantines relating to pests covered by Federal quarantines. Of these interceptions, 1 was made at Albany, 4 at Boston, 2 at New Haven, 63 at New York, 10 at Philadelphia, 3 at Pittsburgh, and 1 at Washington.

FOREIGN PLANT QUARANTINES

Twenty-four foreign plant quarantines and regulatory orders of the Department prohibiting or restricting the entry of various plants and plant products into the United States, 8 domestic quarantines affecting the movement of such material between the Territories of Hawaii and Puerto Rico and continental United States, and 4 miscellaneous regulatory measures are enforced through the Division of Foreign Plant Quarantines by inspectors and collaborators stationed at the more important ports of entry and at foreign-mail distributing points, and working in close cooperation with employees of other Government departments. Detailed information on these quarantines and orders is available in other publications.

Enforcement activities in connection with these quarantines and orders are more fully explained in succeeding sections and are accompanied by tables presenting in condensed form records indicating the scope of the work or summarizing its results.

RECORDS OF IMPORTS OF RESTRICTED PLANTS AND PLANT PRODUCTS

Under the various foreign quarantines and orders certain plants and plant products are restricted as to entry, are subject to inspection and, if necessary, disinfection, for the purpose of excluding plant diseases and insect pests. Among such restricted plants and plant products are nursery stock, plants, bulbs, and

seeds; fruits and vegetables; grains from certain countries; cotton, cotton waste, cotton wrappings (bagging), and cottonseed products; cottonseed, seed cotton, and cottonseed hulls from the Imperial Valley, Lower California, Mexico; certain packing materials; and elm logs from European countries. A record is given of the importation of the products inspected by inspectors of the Bureau and, if necessary, treated under their supervision.

IMPORTATIONS OF NURSERY STOCK, PLANTS, BULBS, AND SEEDS

The importations recorded in tables 16 to 19 inclusive, are entered under regulation 3 of Quarantine No. 37, under permits that are valid until revoked and which do not limit the quantity that may be imported. The restrictions under this regulation are intended merely to afford opportunity to inspect and, if necessary, to safeguard the products as they are entered. Table 16 records the number of importations of fruit and nut cuttings and scions, and of rose stocks inspected and, if necessary, treated, during the fiscal year 1934. This table also shows the total number of such importations similarly handled during the fiscal year 1933. A record of certain bulbs entered under permit subject to inspection and treatment is furnished in table 17. In addition to the importations of bulbs, corms, etc., recorded in this table, there were imported under the provisions of item 6, regulation 3, for propagation, 7½ pounds and 110 tubers of Jerusalem artichokes from England and France, and 79,365 pounds of onion sets from Greece, 1 pound from Australia, and 1 pound from England. Table 18 records the number of various kinds of bulbs entered under permit for each of the past 8 years. Table 19 shows the number of pounds of tree seeds imported under permit for the fiscal year 1934 and the countries of origin of such seeds.

TABLE 16.—*Importation of fruit and nut cuttings and scions, and of rose stocks under regulation 3, Quarantine No. 37, from the countries indicated, fiscal year 1934*

[Figures indicate number of plants]

Kind of stocks, cuttings, and scions	Australia	Canada	Cuba	Czechoslovakia	England	France	Greece	Hungary	Italy	Lithuania	Mexico
Cuttings and scions:											
Apple.....	35	141	-----	-----	302	-----	-----	-----	6	18	-----
Apricot.....	-----	28	-----	-----	-----	-----	-----	-----	-----	-----	-----
Avocado.....	-----	-----	130	-----	-----	-----	-----	-----	-----	-----	11
Cherry.....	-----	12	-----	-----	-----	-----	-----	-----	-----	-----	-----
Fig.....	-----	-----	-----	-----	-----	-----	-----	234	-----	-----	-----
Grape.....	-----	5,000	-----	104	-----	-----	159	60	82,687	-----	-----
Nut.....	-----	595	-----	-----	-----	-----	-----	-----	-----	-----	-----
Peach.....	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Pear.....	125	45	-----	-----	-----	-----	-----	-----	6	-----	-----
Pineapple.....	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	30
Plum.....	-----	135	-----	-----	-----	-----	-----	-----	17	-----	-----
Prune.....	-----	-----	-----	-----	-----	-----	-----	-----	6	-----	-----
Spondias.....	-----	-----	16	-----	-----	-----	-----	-----	-----	-----	-----
Rose stocks.....	-----	-----	-----	-----	1,676,000	35,000	-----	-----	-----	-----	-----
Total.....	160	5,956	146	104	1,676,302	35,000	159	60	82,956	18	41

Kind of stocks, cuttings, and scions	Netherlands	Poland	Rumania	Scotland	Sweden	Switzerland	Union of Soviet Socialist Republics	Yugoslavia	Total	
									1934	1933
Cuttings and scions:										
Apple.....	-----	-----	12	-----	51	-----	-----	-----	565	522
Apricot.....	-----	-----	-----	-----	-----	-----	35	-----	63	-----
Avocado.....	-----	-----	-----	-----	-----	-----	-----	-----	141	-----
Cherry.....	-----	-----	5	-----	31	61	-----	-----	109	40
Fig.....	-----	-----	-----	-----	-----	-----	-----	-----	234	561
Grape.....	-----	-----	-----	-----	-----	-----	-----	41	88,051	6,630
Nut.....	-----	408	-----	-----	-----	-----	-----	-----	1,003	-----
Peach.....	-----	-----	5	-----	-----	-----	-----	-----	5	23
Pear.....	-----	-----	24	-----	54	-----	-----	-----	254	41
Pineapple.....	-----	-----	-----	-----	-----	-----	-----	-----	30	-----
Plum.....	-----	-----	-----	-----	8	-----	-----	-----	160	135
Prune.....	-----	-----	-----	-----	-----	-----	-----	-----	6	-----
Spondias.....	-----	-----	-----	-----	-----	-----	-----	-----	16	-----
Rose stocks.....	4,790,150	-----	-----	35,000	-----	-----	-----	-----	6,536,150	6,453,382
Total.....	4,790,150	408	46	35,000	144	61	35	41	6,626,787	6,461,334

TABLE 17.—*Importation of bulbs under regulation 3, Quarantine No. 37, from countries indicated, fiscal year 1934*

[Figures indicate number of bulbs]

Bulbs	Australia	Bermuda	Canada	Canal Zone	China	Denmark	England	France	Germany	India	Ireland
Chionodoxa											
Convallaria							2,024		9,476,619		
Crocus							287				
Eranthis							6				
Fritillaria											6
Galanthus							4,158				
Hyacinth			406			2	66	309,200			
Ixia											
Lily		234,396	424	12	254		1,947	519,704		3,262	43
Muscari											
Narcissus ¹					12,600						
Scilla			900				1,082	3			
Tulip	45		7,512				542	87,250	58		
Total	45	234,396	9,242	12	12,854	2	10,112	916,157	9,476,677	3,262	49

Bulbs	Italy	Japan	Manchuria	Netherlands	Philippine Islands	Sweden	Switzerland	Union of South Africa	Total
Chionodoxa				437,072					437,072
Convallaria				26,850		6			9,505,499
Crocus				7,158,191					7,158,478
Eranthis				326,978					326,984
Fritillaria				319,825		24			319,855
Galanthus				756,685					760,843
Hyacinth		264		12,188,128					12,498,066
Ixia				187,136				89	187,225
Lily	5,367	15,031,729	100	306,530	30				16,103,798
Muscari				1,118,667					1,118,667
Narcissus ¹									12,600
Scilla				1,720,924					1,722,909
Tulip	2,500	8,000		68,260,106			25		68,366,038
Total	7,867	15,039,993	100	92,807,092	30	30	25	89	118,518,034

¹ The order of the Acting Secretary of Agriculture of Oct. 31, 1928, authorizes the importation of the Chinese sacred lily (*Narcissus tazetta* var. *orientalis*) into Hawaii for local use and distribution under permit and subject to inspection, under the provisions of regulation 3 of Quarantine No. 37.

TABLE 18.—*Summary of bulb importations under regulation 3, Quarantine No. 37, for fiscal years 1927-34*

[Figures indicate number of bulbs]

Bulbs	1927	1928	1929	1930
Chionodoxa	466,872	439,075	487,228	476,422
Convallaria	20,558,460	24,738,880	23,087,167	23,661,236
Crocus	9,969,070	8,775,467	9,886,546	8,075,439
Eranthis	144,150	135,842	143,592	188,611
Fritillaria	125,688	111,778	115,658	122,699
Galanthus	844,544	662,989	718,130	751,523
Hyacinth	23,711,178	22,127,888	21,450,547	20,255,057
Ixia	529,404	704,644	827,154	461,252
Lily	16,228,762	19,917,477	21,453,024	20,737,428
Muscari	993,339	1,150,220	1,639,982	1,473,455
Narcissus ²				
Scilla	1,553,313	1,341,685	1,436,988	1,544,889
Tulip	129,681,036	161,940,818	191,959,162	163,604,912
Unclassified	11,112			
Total	204,816,928	242,046,763	273,205,178	241,352,923

TABLE 18.—*Summary of bulb importations under regulation 3, Quarantine No. 37, for fiscal years 1927-34—Continued*

Bulbs	1931	1932 ¹	1933 ¹	1934 ¹
Chionodoxa.....	548, 465	518, 885	416, 247	437, 072
Convallaria.....	17, 273, 064	16, 015, 817	10, 192, 434	9, 505, 499
Crocus.....	9, 033, 346	8, 801, 592	7, 002, 833	7, 138, 478
Eranthis.....	186, 516	186, 630	145, 019	326, 984
Fritillaria.....	166, 174	137, 052	128, 629	319, 855
Galanthus.....	918, 613	800, 922	645, 216	760, 843
Hyacinth.....	21, 759, 225	19, 360, 849	16, 672, 803	12, 498, 066
Isia.....	368, 982	326, 796	114, 810	187, 225
Lily.....	19, 561, 911	17, 370, 254	15, 196, 118	16, 103, 798
Muscari.....	1, 523, 243	1, 361, 018	934, 073	1, 118, 667
Narcissus ²		17, 880	14, 820	12, 600
Scilla.....	1, 699, 123	1, 618, 579	1, 254, 181	1, 722, 909
Tulip.....	153, 868, 063	125, 381, 713	92, 755, 262	68, 366, 038
Total.....	226, 906, 725	191, 897, 981	145, 472, 445	118, 518, 024

¹ The summaries of importations for the fiscal years 1932, 1933, and 1934 include importations into Hawaii and Puerto Rico.

² Narcissus importations under regulation 3 of Quarantine No. 37 are limited to importations of the Chinese sacred lily (*Narcissus tazetta* var. *orientalis*), the entry of which is permitted into the Hawaiian Islands for local use and distribution in those islands only.

TABLE 19.—*Importation of tree seeds under regulation 3, Quarantine No. 37, from the countries indicated, fiscal year 1934*

[Figures indicate number of pounds]

Country of origin	Apple	Apricot	Banana	Cherry	Elm	Nut and palm	Ornamental and tree	Peach	Pear	Persimmon	Plum	Quince	Rose	Miscellaneous	Total
Algeria.....							1								1
Anglo-Egyptian Sudan.....							1								1
Argentina.....							1								1
Australia.....					21, 113		34							1	21, 148
Austria.....	130			72			27, 322		73				6		27, 603
Belgian Congo.....						1									1
Bolivia.....														2	2
Brazil.....						192	2								194
British Guiana.....						4	2								6
British Honduras.....						1	1								2
Canada.....							2, 493				165				2, 658
Canal Zone.....							1								1
Canary Islands.....						4	5								9
Cayman Islands.....													11		11
Chile.....							2								2
China.....					115		1, 039								1, 154
Cuba.....						3	8								11
Czechoslovakia.....							11, 388								11, 388
Denmark.....	200			4		4	213		25				4		450
Dominica.....						2	2								4
England.....							27								27
Finland.....							4								4
France.....	8, 130		1	1, 045		23	238	36	523			25			10, 021
Germany.....	27						11, 881		7		3		12		11, 930
Gold Coast.....						4									4
Greece.....							2								2
Guam.....						3									3
Guatemala.....							1								1
Honduras.....						2	3								5
Hungary.....							937								937
India.....		1				5	71	2							79
Iraq.....							1								1
Ireland.....							1								1
Italy.....				20			14, 501				50				14, 571
Jamaica.....						4	2								6
Japan.....					879	248	1, 371	22	436	12			88		3, 056
Java.....						1									1
Kenya.....						9									9
Manchuria.....					1	2	96								99
Mauritius.....						21									21
Mexico.....			4				103							3	110
Morocco.....							5								5
Netherlands.....							27								27

TABLE 19.—*Importation of tree seeds under regulation 3, Quarantine No. 37, from the countries indicated, fiscal year 1934—Continued*

[Figures indicate number of pounds]

Country of origin	Apple	Apricot	Banana	Cherry	Elm	Nut and palm	Ornamental and tree	Peach	Pear	Persimmon	Plum	Quince	Rose	Miscellaneous	Total
New Zealand							141								141
Nyasaland						1									1
Palestine							4								4
Philippine Islands							15							1	16
Portugal														1	1
Scotland							14								14
Society Islands							1								1
Sierra Leone						11									11
Straits Settlements						6									6
Tanganyika Territory						6	2								8
Trinidad						205									205
Turkey							22								22
Uganda						2									2
Union of South Africa							11								11
Union of Soviet Socialist Republics							7,631								7,631
Yugoslavia							5								5
Total ¹	8,487	1	5	1,141	995	21,877	79,632	60	1,064	12	218	25	110	19	113,646

¹ In addition to the seeds indicated in this table, 341 small mail packages of miscellaneous seeds were imported into continental United States from 57 foreign countries. The following were imported into Puerto Rico: 1,626 pounds of seeds of ornamentals and trees from the Dominican Republic, Guadeloupe, India, and the Virgin Islands; into Hawaii the following: 3 packages and 158 pounds of nut and palm seeds, 21 packages and 51 pounds of seeds of ornamentals and trees, and 3 packages of miscellaneous seeds from Australia, Canal Zone, Ceylon, China, Cuba, Fiji Islands, France, Germany, Guatemala, India, Japan, Marshall Islands, New Zealand, Philippine Islands, Samoa, Siam, Straits Settlements, and the Union of South Africa.

In addition to the foregoing, there were imported from the Dominion of Canada under regulation 15, Quarantine No. 37, 8,859,163 bulbs, plants, trees, and cuttings, as compared with 119,990 during the fiscal year 1933. This enormous increase is attributable to the inclusion of 7,795,945 spruce seedlings and 850,053 pine seedlings (other than 5-leaved pines) for reforestation purposes. To authorize the importation of material under the provisions of said regulation, 746 permits were issued during the fiscal year 1934, as compared with 696 permits issued during the fiscal year 1933.

The record of entry under special permits issued under the provisions of regulation 14 of Quarantine No. 37 for the purpose of keeping the country supplied with new, improved, or unavailable varieties and necessary propagating stock and for experimental, educational, or scientific purposes, is furnished in table 20.

TABLE 20.—*Special-permit importations, fiscal year 1934, with combined total for the fiscal years 1920-34*

Class of plants	Fiscal year 1934				Total for fiscal years 1920-34			
	Permits issued		Importations under permits		Permits issued		Importations under permits	
	Number	Quantity authorized	Number	Quantity imported	Number	Quantity authorized	Number	Quantity imported
Dahlia	116	4,366	99	2,579	959	62,747	823	44,862
Gladiolus	102	105,578	85	82,351	2,091	50,908,749	1,768	28,812,978
Iris, bulbous	36	624,690	17	160,023	1,627	54,252,379	1,389	39,353,487
Iris, rhizomatous	63	4,248	49	1,131	1,629	297,910	1,429	159,992
Narcissus	73	1,140,709	53	265,950	1,474	164,220,442	1,229	79,486,003
Orchid	225	14,832	182	9,415	2,340	259,277	2,073	198,783
Peony	38	844	23	311	1,297	1,399,933	1,066	685,153
Rose	67	3,249	57	2,821	1,520	274,237	1,352	195,549
Fruit (trees and small fruits)	32	2,294	15	1,029	259	23,110	178	11,208
Herbaceous	160	16,394	125	11,895	1,879	4,887,373	1,507	3,056,929
Miscellaneous bulbs, roots, etc.	181	76,662	125	34,860	2,088	13,106,154	1,788	6,864,157
Ornamental	324	138,938	333	95,881	2,885	4,131,961	2,601	2,391,810
Total		2,132,804		668,246		293,824,272		161,260,911

During the year 1,340 permits were issued authorizing the entry of 2,132,804 plants, bulbs, etc. A total of 668,246 plants, bulbs, etc., were imported as compared with 3,128,294 in 1933. The great disparity between the quantity authorized entry and the quantity actually imported during the year is explained in part by the fact that permits have been issued during this year for several relatively large bulb importations to be made early in the fiscal year 1935. Increased importations, as compared with those in 1933, are noted for dahlias, fruits (trees and small fruits), and ornamentals. In the last group 47,737 more plants, etc., were imported than in 1933. Bulbous iris importations were 1,634,566 bulbs less, and narcissus importations 810,406 bulbs less than in 1933. Proportionately large decreases in quantities imported are also noted in the case of peonies, roses, and the herbaceous group and miscellaneous bulbs, roots, etc. Sixty-two percent of the importations were authorized entry by mail as compared with 71 percent so authorized in 1933. A summary of special permits issued during the entire period of the quarantine to June 30, 1934, is given in table 21. The distribution of special-permit material by States is shown in table 22, which is cumulative.

TABLE 21.—*Special-permit importations, yearly totals for the fiscal years 1920–34*

Fiscal year	Permits issued		Importations under permits	
	Number	Quantity authorized	Number	Quantity imported
1920.....	311	10,752,844	171	3,484,195
1921.....	623	13,965,113	411	8,132,634
1922.....	751	9,573,223	519	3,344,050
1923.....	902	15,176,718	723	10,358,921
1924.....	1,115	15,381,913	869	12,561,574
1925.....	1,249	9,518,620	1,099	8,575,741
1926.....	1,465	80,983,487	1,220	6,022,041
1927.....	1,480	54,008,092	1,279	46,625,648
1928.....	1,638	37,955,017	1,386	24,645,001
1929.....	1,389	16,981,012	1,377	17,972,441
1930.....	1,343	11,219,533	1,162	2,073,116
1931.....	1,418	8,230,924	1,300	10,121,457
1932.....	1,306	6,276,579	1,195	3,547,552
1933.....	1,145	1,668,393	1,074	3,128,294
1934.....	1,340	2,132,804	1,007	668,246
Total.....	17,475	293,824,272	14,732	161,260,911

NOTE.—The disparity in the number of bulbs, plants, etc., imported, as compared with the number authorized entry, may be explained by the fact that permits for some classes of plants, particularly narcissus and bulbous iris, are usually issued during one fiscal year and the importations made during the following fiscal year.

TABLE 22.—*Distribution, by States, showing number of plants, bulbs, etc., of special-permit material imported for the fiscal years 1920–34*

State or Territory	Dahlia	Gladiolus	Iris, bulbous	Iris, rhizomatous	Narcissus	Orchid	Peony
Alabama.....		15,115	30,980		6,000		50
Arizona.....	14	12			1,000	14	
Arkansas.....			20,000				
California.....	6,952	1,935,544	11,125,148	34,931	5,680,516	42,092	4,192
Colorado.....	66	53,248	33,490			2,055	150
Connecticut.....	1,305	16,744	84,822	1,584	57,735	1,982	113
Delaware.....		2,000	169,300	22	28	2,128	1,018
District of Columbia.....	166	519	215	93	325	397	
Florida.....		48,930	357,362		6,915,130	3,607	
Georgia.....	360	9,210	330,479	181	14,760		
Hawaii.....	12	298		534		11,118	
Idaho.....		1,618	2,534	24			
Illinois.....	1,326	3,290,726	901,938	15,781	306,410	2,451	48,021
Indiana.....	238	2,390,112	502,765	3,126	1,414	360	10,213
Iowa.....		112,225	10,035	10	250		24,012
Kansas.....	99		32	2,263	141		3,070
Kentucky.....	408		51,200	1	564	415	133
Louisiana.....	129	2,695	32,744		10,363	2,070	
Maine.....		350		43		24	262
Maryland.....	576	41,906	844,490	413	1,923,725	648	20,833

TABLE 22.—*Distribution, by States, showing number of plants, bulbs, etc., of special-permit material imported, for the fiscal years 1920-34—Continued*

State or Territory	Dahlia	Gladiolus	Iris, bulbous	Iris, rhizom- atous	Narcissus	Orchid	Peony
Massachusetts.....	2,537	3,461,497	542,687	3,732	102,539	29,127	6,828
Michigan.....	4,535	12,386,054	1,188,486	3,920	2,642,402	730	87,719
Minnesota.....	280	89,394	345	3,505	11,000	822	7,549
Mississippi.....	49	6,500	52,776	9	9,260	-----	-----
Missouri.....	253	3,173	281,211	641	1,238	4,910	991
Montana.....	-----	32	-----	-----	-----	-----	-----
Nebraska.....	276	1,142	-----	73	147	-----	14
New Hampshire.....	7	40,065	21,862	-----	211	-----	-----
New Jersey.....	8,410	130,069	1,177,696	11,515	1,283,993	30,135	41,069
New Mexico.....	-----	-----	5,123	6	270	-----	-----
New York.....	5,319	2,659,437	6,280,364	45,360	16,026,838	38,193	223,129
North Carolina.....	82	775,417	6,245,895	15	1,623,355	1,045	-----
North Dakota.....	-----	105,389	-----	-----	-----	-----	7
Ohio.....	3,165	495,131	67,129	20,786	1,307	720	129,396
Oklahoma.....	-----	510	14,000	-----	-----	-----	-----
Oregon.....	2,071	77,000	1,331,936	1,761	2,767,531	-----	2,831
Pennsylvania.....	2,154	394,156	462,768	2,997	3,569,418	20,335	53,983
Puerto Rico.....	-----	-----	-----	-----	-----	786	-----
Rhode Island.....	1,079	4,040	258,101	1,599	371,800	157	5,209
South Carolina.....	-----	-----	297,500	2	8,890,684	19	-----
South Dakota.....	-----	1,701	-----	54	839,808	-----	2,443
Tennessee.....	623	-----	194,002	823	-----	-----	242
Texas.....	1	2,000	961,669	50	7,766,143	30	-----
Utah.....	7	1,131	30,750	-----	11,400	-----	-----
Vermont.....	-----	32,325	8,010	36	-----	-----	2,359
Virginia.....	313	20,465	2,919,363	4	5,611,863	66	1,692
Washington.....	1,747	148,846	2,400,316	3,555	12,767,396	1,036	3,660
West Virginia.....	37	230	4,000	-----	-----	-----	-----
Wisconsin.....	266	56,022	109,964	543	269,250	1,100	3,965
Total.....	44,862	28,812,978	39,353,487	159,992	79,486,003	198,783	685,153

State or Territory	Rose	Fruit ¹	Herba- ceous ¹	Miscel- laneous bulbs, roots, etc. ¹	Orna- mental	Total
Alabama.....	174	-----	115	335	1,879	54,648
Arizona.....	9	-----	239	4	5,413	6,705
Arkansas.....	50	-----	-----	-----	-----	20,050
California.....	43,412	568	5,144	136,598	2,105,800	21,120,897
Colorado.....	-----	-----	100	-----	5,887	94,996
Connecticut.....	31,608	10	2,572	565	158,115	357,155
Delaware.....	-----	-----	42	175	5,319	180,032
District of Columbia.....	379	-----	6	808	391	3,299
Florida.....	21	-----	321	86,268	279,454	7,691,093
Georgia.....	108	2	1	185	3,387	358,673
Hawaii.....	-----	1,428	13	1,910	4,958	20,271
Idaho.....	-----	-----	43	377	45	4,641
Illinois.....	10,271	7	3,426	6,165	230,660	4,817,182
Indiana.....	2,792	6	751	7,986	30,862	2,950,625
Iowa.....	-----	875	163	180	14,373	162,123
Kansas.....	60	-----	50	133	574	6,422
Kentucky.....	2	-----	92	-----	64	52,879
Louisiana.....	190	-----	111	773	1,831	50,906
Maine.....	-----	-----	202	980	1,013	2,874
Maryland.....	4,855	21	1,058	2,083	79,362	2,919,970
Massachusetts.....	3,466	24	1,636	4,781	438,584	4,597,438
Michigan.....	335	-----	16,831	17,217	574,370	16,922,599
Minnesota.....	160	-----	12	3,686	35,640	152,393
Mississippi.....	70	-----	-----	5	252	68,921
Missouri.....	-----	-----	274	167	19,803	312,661
Montana.....	-----	-----	-----	-----	100	132
Nebraska.....	-----	-----	14	-----	531	1,977
New Hampshire.....	-----	6	222	646	1,568	64,807
New Jersey.....	41,737	463	71,730	23,269	2,751,314	5,571,400
New Mexico.....	-----	-----	-----	12	-----	5,411
New York.....	29,208	870	57,715	325,541	3,117,487	28,809,461
North Carolina.....	2	-----	4	20,555	774	8,667,144
North Dakota.....	1	-----	-----	53	-----	105,450
Ohio.....	5,267	164	10,982	16,253	777,735	1,528,035
Oklahoma.....	-----	-----	-----	-----	202	14,712
Oregon.....	2,190	-----	680	72,508	55,292	4,313,800

¹ Prior to 1929 this material was recorded under ornamentals, etc.

TABLE 22.—*Distribution, by States, showing number of plants, bulbs, etc., of special-permit material imported for the fiscal years 1920-34—Continued*

State or Territory	Rose	Fruit	Herba- ceous	Miscel- laneous bulbs, roots, etc.	Orna- mental	Total
Pennsylvania.....	13, 187		653	12, 203	256, 560	4, 788, 414
Puerto Rico.....			400		335	1, 521
Rhode Island.....	552		173	2, 239	46, 491	691, 440
South Carolina.....			73	33	68	9, 188, 379
South Dakota.....	3, 213		12		896	8, 319
Tennessee.....	87	64		1, 623	3, 465	1, 040, 737
Texas.....	808	36	10		76, 401	8, 807, 148
Utah.....				21	4, 747	48, 056
Vermont.....				98	2, 621	45, 449
Virginia.....	16		129	4, 644	46, 137	8, 604, 692
Washington.....	799	3	1, 461	33, 551	162, 853	15, 525, 223
West Virginia.....			12		36	4, 315
Wisconsin.....	520		1, 134	2, 636	50, 036	495, 436
Total.....	195, 549	4, 547	178, 606	787, 266	11, 353, 685	161, 260, 911

IMPORTATION OF ELM LOGS UNDER QUARANTINE NO. 70

Notice of Quarantine No. 70, on account of the Dutch elm disease, was approved October 21, 1933, and became effective the same date. Under the provisions of this quarantine elm logs have been imported from Europe subject to hot-water treatment as follows: Through the port of Baltimore, 5 logs; New York, 33 logs; and Norfolk, 6 logs, or a total of 44 logs. Hot-water treatment was applied to these logs at the places where they were to be converted into veneers, namely: Indianapolis, 29 logs; Long Island City, 2 logs; New York, 7 logs; and Portsmouth, Va., 6 logs.

IMPORTATIONS OF COTTON, COTTON WRAPPINGS (BAGGING), SEED COTTON, AND COTTONSEED PRODUCTS

Tables 23 to 26, inclusive, indicate, respectively, the importations during the fiscal year of cotton, cotton waste, cotton wrappings (bagging), seed cotton, and cottonseed products, which were inspected and, when necessary, fumigated or otherwise treated under supervision. The actual number of bales of cotton, cotton waste, and bagging is indicated, and inasmuch as bales vary in size they are referred to as running bales.

TABLE 23.—*Importation of running bales of ginned cotton, by country of growth and port of entry, fiscal year 1934*

Country	Boston	Calex- ico	Gal- veston	Hous- ton	New Orleans	New- port	New York	Niagara Falls
Anglo-Egyptian Sudan.....	8, 804							
Argentina.....	5							
British West Indies.....	12						25	
China.....	592						3, 571	
Colombia.....							1	
Dutch East Indies.....	133						599	
Egypt.....	50, 155						19, 977	
Haiti.....							1	
India.....	6, 765						22, 405	
Japan.....							137	
Mexico.....		4, 832					2, 494	
Nigeria.....	107							
Peru.....	724						1, 107	
United States (returned).....	475		1, 961	164	1	18	59	91
Unknown.....							216	
Total.....	67, 772	4, 832	1, 961	164	1	18	50, 592	91

TABLE 23.—*Importation of running bales of ginned cotton, by country of growth and port of entry, fiscal year 1934—Continued*

Country	Port-land	Rouses Point	St. Albans	San Francisco	San Pedro	Seattle	Vance-boro	Total
Anglo-Egyptian Sudan.....								8,804
Argentina.....								5
British West Indies.....								37
China.....	252			11,657	100	4,601		20,773
Colombia.....				304				1
Dutch East Indies.....								1,036
Egypt.....								70,132
Haiti.....								1
India.....	50			1,568	1,470	50		32,308
Japan.....								137
Mexico.....				2,779	1,332			11,437
Nigeria.....								107
Peru.....								1,831
United States (returned).....		1	77				291	3,138
Unknown.....								216
Total.....	302	1	77	16,308	2,902	4,651	291	149,963

¹ Includes 6,064 bales of linters.TABLE 24.—*Importation of running bales of cotton waste, by country of origin and port of entry, fiscal year 1934*

Country	Balti-more	Bos-ton	Buf-falo	Charles-ton	Hous-ton	Ma-lone	New-port	New York	Ni-agara Falls	Nor-folk
Belgium.....		1,309						2,449		
Canada.....		209	216			54	344		50	
China.....	200	1,469						6,910		50
Colombia.....								3		
England.....		8,639		30	5			4,611		
France.....		514						4,311		
Germany.....		1,183		49				1,678		
India.....		353						10,195		150
Italy.....								248		
Japan.....					120			654		
Mexico.....								31		
Netherlands.....	97	1,866		222				8,180		250
Scotland.....		25								
Spain.....								2,334		
United States (returned).....		10							5	
Total.....	297	15,577	216	301	125	54	344	41,604	55	450

Country	Phila-delphia	Rich-ford	Rouses Point	St. Al-bans	San Fran-cisco	San Pedro	Savan-nah	Seat-tle	Ta-coma	Vance-boro	Total
Belgium.....											3,758
Canada.....		12	135	1,240						5	2,265
China.....	5,873				400	1		100			15,003
Colombia.....											3
England.....	233						138				13,656
France.....	50						134				5,009
Germany.....	41						26				2,977
India.....	50				935						11,683
Italy.....											248
Japan.....	2,505				50	505		918	120		4,872
Mexico.....											31
Netherlands.....											10,615
Scotland.....											25
Spain.....											2,334
United States (returned).....											15
Total.....	8,752	12	135	1,240	1,385	506	298	1,018	120	5	72,494

TABLE 25.—*Importation of running bales of bagging, by country of origin and port of entry, fiscal year 1934*

Country	Baltimore	Beaumont	Boston	Buffalo	Charleston	Detroit	Galveston	Houston	Lake Charles	New Orleans	Newport	New York
Australia.....								233				2
Austria.....					454							4,351
Belgium.....	961		659		141		799	1,145		2,100		18
Bermuda.....												1,170
Canada.....			3,143	134		4,336					133	24
China.....	615											894
Cuba.....	37						903			1,909		43
Czechoslovakia.....					503					43		2,601
Egypt.....			430									2,910
England.....	1,674		546		2,017		22,321	4,714		10,053		4,920
France.....	76		673				2,843	10,174		998		3,334
Germany.....			217		890		11,110	7,366	514	1,136		175
India.....		50	306							1,905		2,276
Ireland.....												654
Italy.....								8,330		3,186		3,046
Japan.....	1,595				10,020		5,955	1,200		227		1
Netherlands.....	989		147		324		2,687	3,675		4,369		656
Poland.....					252							861
Portugal.....							335	331		134		3,184
Puerto Rico.....												3,270
Scotland.....	429		318				41,565	2,200		10,991		180
Spain.....	235							438		80		97
Sweden.....												
Wales.....												
Total.....	6,611	50	6,439	134	14,601	4,336	88,518	39,806	514	37,131	133	34,624

Country	Niagara Falls	Norfolk	Philadelphia	Port Huron	Ranier	Rouses Point	St. Albans	San Francisco	San Pedro	Savannah	Seattle	Total
Australia.....												2
Austria.....		418								385		1,490
Belgium.....		1,275	286							1,989		13,706
Bermuda.....												18
Bulgaria.....		153										153
Canada.....	328			2,121	39	332	735					12,471
Canal Zone.....			3									3
China.....			204					580	1,401	2,541		5,365
Cuba.....												3,743
Czechoslovakia.....		1,406										1,952
Egypt.....												3,031
England.....		6,230	3,073							5,123		58,661
France.....		1,240	64							850		21,838
Germany.....		4,751	13							1,870		31,201
India.....		300										2,561
Ireland.....												175
Italy.....		1,501										15,293
Japan.....		3,620	1,200					1,998	1,420	400	3,711	32,000
Netherlands.....		1,511								1,551		18,299
Poland.....		330										583
Portugal.....												1,456
Puerto Rico.....		397										1,258
Scotland.....		210										58,897
Spain.....		1,680										5,703
Sweden.....		195										375
Wales.....												97
Total.....	328	25,217	4,843	2,121	39	332	735	2,578	2,821	14,709	3,711	290,331

TABLE 26.—*Importation of seed cotton, cottonseed hulls, and cottonseed products, fiscal year 1934*

Port	Seed cotton	Cottonseed hulls	Cottonseed cake	Cottonseed meal	Cottonseed oil
	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Gallons</i>
Calexico.....		3,699,804			
El Paso.....			1	30	2
Hidalgo.....					10
New York.....			5		
San Luis, Ariz.....	40,617				
Total.....	1 40,617	1 3,699,804	6	30	12

¹ Entry of cottonseed, seed cotton, and cottonseed hulls grown in the Imperial Valley, Baja California, Mexico, is allowed under permit. No cottonseed was imported this year.

In addition, the Bureau supervised the entry of 13,135 samples of cotton, cotton linters, and cotton waste imported by freight, express, and parcel post and as passenger baggage.

IMPORTATIONS OF GRAIN AND BROOMS

Table 27 shows the importations of shelled corn inspected under the provisions of Quarantine No. 41.

TABLE 27.—*Importation of clean shelled corn under Quarantine No. 41, by country of growth, fiscal year 1934*

Country	Pounds ¹	Country	Pounds ¹
Anglo-Egyptian Sudan.....	1	Haiti.....	138,252
Argentina.....	5,420,792	Mexico.....	720,610
Canada.....	679	Peru.....	5
Colombia.....	88	Union of South Africa.....	442
Cuba.....	1,790,652	Union of Soviet Socialist Republics.....	13
Dominican Republic.....	5,359,677	United States (returned).....	2,410
Egypt.....	5		
England.....	12,756	Total.....	13,446,385
France.....	3		

¹ To the nearest pound.

In addition, inspection was made under Quarantine No. 41 of the following: Broomcorn, 345 bales; brooms made of broomcorn, 15,466; corn on cob, green, 73,409 pounds; corn on cob, mature, 1,033 ears; jobs-tears, 101 pounds; sorghum seed, 5 pounds; and Sudan grass, 3,060 pounds.

The Bureau supervised also the entry under Quarantine No. 24 of 600,118 pounds of shelled corn; and under Quarantine No. 55 of 56,002 pounds of seed or paddy rice; 1,165 bales of rice straw and 7 bales of rice straw matting.

IMPORTATIONS OF FRUITS AND VEGETABLES

Tables 28 and 29 show, by countries of origin and ports of entry, respectively, the kinds and quantities of fruits and vegetables imported into the continental United States and into Hawaii and Puerto Rico during the fiscal year under permit and subject to inspection at the port of first arrival under the provisions of Quarantine No. 56 and under the regulations governing the importation of potatoes into the United States.

TABLE 28.—*Fruits and vegetables imported fiscal year 1934, by countries of origin*
 [Imported under Quarantine No. 56 unless otherwise designated]

Kind	Country and quantity	Total
Apple.....pounds..	England, 4; Netherlands, 172; New Zealand, 225,800; Switzerland, 30.	226, 006
Apricot.....do.....	Chile, 288.	288
<i>Aralia cordata</i> do.....	China, 168; Japan, 977.	1, 145
Arrowhead.....do.....	China, 173,858; Japan, 400.	174, 258
Asparagus.....do.....	Argentina, 57,656; Mexico, 70.	57, 726
Avocado.....do.....	Cuba, 6,118,243; Dominican Republic, 10; Mexico (seeds removed), 25,187.	6, 143, 440
Balsamapple.....do.....	Cuba, 13,026; Mexico, 1,013.	14, 039
Banana.....bunches..	British Honduras, 159,346; Colombia, 1,774,346; Costa Rica, 3,360,774; Cuba, 3,613,304; Dominica, 89; Dominican Republic, 6,634; Ecuador, 637,842; Guatemala, 3,515,969; Haiti, 40,433; Honduras, 13,157,761; Jamaica, 319,476; Mexico, 6,927,000; Nicaragua, 2,993,550; Panama (including Canal Zone), 5,102,159; St. Lucia, 187; Virgin Islands, 7.	41,608,877
Bean (green):		
Faba.....pounds..	Mexico, 82.	82
Lima.....do.....	Cuba, 3,605,265; Mexico, 48,997.	3, 654, 262
String.....do.....	Cuba, 259; Mexico, 1,219,940.	1, 220, 199
Beet.....do.....	Bermuda, 2,500; Mexico, 266,019; Newfoundland, 20.	268, 539
Berry (<i>Rubus</i>).....do.....	Newfoundland, 10; Norway, 484.	494
Breadfruit.....do.....	Cuba, 32.	32
Brussels sprouts.....do.....	Mexico, 1.	1
Burdock.....do.....	Japan, 550.	550
Cabbage.....do.....	Cuba, 30,276; Mexico, 27,388; Netherlands, 368,714; Newfoundland, 20.	426, 398
Cacao bean pod.....do.....	Costa Rica, 342; Trinidad, 235.	577
Carrot.....do.....	Mexico, 410,036; Newfoundland, 20.	410, 056
Cassava.....do.....	Cayman Islands, 125; China, 1,400; Cuba, 120,021; Dominican Republic, 153; Panama, 150.	121, 849
Cauliflower.....do.....	Mexico, 1,614.	1, 614
Celery.....do.....	Mexico, 25.	25
Chayote.....do.....	Cuba, 8,101; Dominican Republic, 2,783; Mexico, 3,180.	14, 064
Cherry:		
Dried, sour.....do.....	Czechoslovakia, 12,090; Italy, 142,600; Yugoslavia, 992,536.	1, 147, 226
Fresh.....do.....	Chile, 4,663.	4, 663
Chinese watermelon.....do.....	Cuba, 5,576.	5, 576
Cipollino.....do.....	Italy, 44; Morocco, 2,331,932.	2, 331, 976
<i>Citrus medica</i> do.....	Albania, 3,122; Greece, 1,377; Italy, 960; Palestine, 22,967.	28, 426
Clover top.....do.....	Mexico, 193.	193
Coriander.....do.....	Mexico, 237.	237
Cowpea.....do.....	Mexico, 24.	24
<i>Crescentia alata</i> do.....	Mexico, 190.	190
Crosnes.....do.....	Belgium, 397.	397
Cucumber.....do.....	Cuba, 1,435,885; Mexico, 7,502.	1, 443, 387
Dasheen (includes colocasia, inhame, malanga, taro, and yautia).....pounds..	Azores, 261,213; China, 357,835; Cuba, 82,140; Haiti, 156; Dominican Republic, 1,704,728; Mexico, 2,409; Japan, 151,500; Panama (including Canal Zone), 5.	2, 559, 986
Eggplant.....do.....	Cuba, 3,615,774; Mexico, 138,610.	3, 754, 384
Endive.....do.....	Belgium, 786,695.	786, 695
Garbanzo.....do.....	Mexico, 25.	25
Garlic.....do.....	Argentina, 683; Azores, 12; Belgium, 7,091; Chile, 2,797,451; China, 1,780; Hungary, 487,647; Italy, 745,817; Mexico, 637,844; Morocco, 247; Spain, 1,880,939.	6, 559, 511
Ginger (crude).....do.....	China, 340,861; Cuba, 52,250; Dominican Republic, 583; Japan, 1,013; Mexico, 24.	394, 731
Grape:		
Fresh (not hothouse).....do.....	Argentina, 10,299,495; Chile, 992,776; Mexico, 517.	11,292,788
Hothouse.....do.....	Belgium, 78,093.	78, 093
Processed.....do.....	Italy, 48,982.	48, 982
Grapefruit.....do.....	Cuba, 2,287,376.	2, 287, 376
Horseradish.....do.....	Denmark, 4,249; Japan, 125; Sweden, 24,660.	29, 034
Husk tomato.....do.....	Mexico, 8,965.	9, 965
Japanese horseradish.....do.....	China, 420; Japan, 432.	8, 852
Kale.....do.....	Bermuda, 223,940; Mexico, 18.	223, 958
Kohlrabi.....do.....	Mexico, 34.	34
Kudzu.....do.....	China, 61,856.	61, 856
Leek.....do.....	Mexico, 6.	6
Lemon.....do.....	Argentina, 440; Azores, 36; Cuba, 45; Italy, 3,805,191; Jamaica, 375; Mexico, 124.	3, 806, 211
Lettuce.....do.....	Mexico, 35,566.	35, 566
Lily bulb (edible).....do.....	China, 24,282; Japan, 20.	24, 302
Lime (sour).....do.....	Antigua, 3,246; British Guiana, 2,560; Chile, 1,240; Costa Rica, 288; Cuba, 9,201; Dominica, 582,446; Dominican Republic, 6,795; Grenada, 9,310; Haiti, 3,154; Honduras, 37,701; Jamaica, 214,665; Mexico, 4,737,128; Montserrat, 233,851; Nicaragua, 783; St. Lucia, 478,526; St. Vincent, 3,480; Samoa, 20; Spain, 8,675; Trinidad, 184,530; Virgin Islands, 8,615.	6, 526, 208

TABLE 28.—*Fruits and vegetables imported fiscal year 1934, by countries of origin—*
Continued

Kind	Country and quantity	Total
Litchi fruit (in brine).....pounds..	China, 20.....	20
Mango (seeds removed, frozen).....do....	Philippine Islands, 114,408.....	114,408
Melon.....do.....	Argentina, 339,186; Chile, 4,988,154; Italy, 390; Mexico, 2,083,110; Spain, 533,696; Uruguay, 1,770.....	7,946,306
Mint.....do.....	Mexico, 24.....	24
Mustard.....do.....	Cuba, 2,939; Mexico, 102,801.....	105,740
Nectarine.....do.....	Belgium, 90; Chile, 305,679.....	305,769
Nopale.....do.....	Mexico, 15.....	15
Nuts:		
Acorn.....do.....	Turkey, 25,426,014.....	25,426,014
Chestnut.....do.....	China, 25,443; Italy, 8,229,038; Japan, 836,645; Portugal, 3,117,693; Philippine Islands, 50; Spain, 979,430.....	13,188,301
Okra.....do.....	Cuba, 1,355,706; Mexico, 37,367.....	1,393,073
Onion.....do.....	Argentina, 10; Australia, 65,447; Azores, 30; Bermuda, 320; Chile, 2,374,166; Egypt, 99,448; Italy, 1,768,546; Mexico, 111,422; Netherlands, 44,800; New Zealand, 2,900; Spain, 414,427; Virgin Islands, 50.....	4,881,566
Orange:		
Under Quarantine No. 56.....do.....	Cuba, 35,625.....	35,625
Mandarin (Quarantine No. 28).....do....	Japan, 1,499,040.....	1,499,040
Papaya:		
Natural.....do.....	Cuba, 7,850; Dominican Republic, 60.....	7,910
Frozen.....do.....	Philippine Islands, 88.....	88
Parsley.....do.....	Bermuda, 3,040; Mexico, 17,582.....	20,622
Parsnip.....do.....	Mexico, 5; Newfoundland, 20.....	25
Pea.....do.....	Cuba, 1,951; Mexico, 4,872,245.....	4,874,196
Peach:		
Fresh.....do.....	Argentina, 18,626; Chile, 175,575.....	194,201
Hothouse.....do.....	Belgium, 10.....	10
Pear.....do.....	Chile, 20,526; England, 15.....	20,535
Pepper.....do.....	Cuba, 1,799,589; Mexico, 1,226,335.....	3,025,924
Peppermint.....do.....	Cuba, 119.....	119
Pigeonpea.....do.....	Cuba, 145.....	145
Pigweed.....do.....	Mexico, 585.....	585
Pineapple.....do.....crates..	Azores, 6; Costa Rica, 74; Cuba, 623,977; Dominican Republic, 6; Ecuador, 199; Haiti, 10; Honduras, 163; Mexico, 28,467; Panama (including Canal Zone), 11; Philippine Islands, 115; Portugal, 13.....	653,043
Plantain.....do.....pounds..	British Honduras, 227,950; Costa Rica, 648; Cuba, 2,054,899; Dominican Republic, 10,426,549; Ecuador, 2,250; Guatemala, 75; Haiti, 46,570; Honduras, 887,730; Mexico, 39,900; Nicaragua, 2,290; Panama (including Canal Zone), 680,630; Venezuela, 87,299.....	14,456,790
Plum.....do.....	Argentina, 14,358; Chile, 72,356.....	86,714
Potato:		
Under Quarantine No. 56.....do.....	Bermuda, 1,667,156.....	1,667,156
Under potato regulations (order of Dec. 22, 1913).....pounds..	Cuba, 15,000; Estonia, 2,200,551; Mexico, 147,258; Spain, 297,281.....	2,660,090
Pricklypear.....do.....	Mexico, 1,617.....	1,617
Pumpkin.....do.....	Cuba, 90,548; Dominican Republic, 54,814; Mexico, 19,573; Panama (including Canal Zone), 30.....	170,965
Purslane.....do.....	Mexico, 1,719.....	1,710
Radish.....do.....	Mexico, 129,158.....	129,158
St. Johns bread.....do.....	Crete, 168,400; Cyprus, 537,600; Greece, 521,834; Italy, 474,549.....	1,702,383
Salsify.....do.....	Mexico, 3,418.....	3,418
Shallot.....do.....	Netherlands, 5,000.....	5,000
Spinach.....do.....	Mexico, 54,440.....	54,440
Squash.....do.....	Bermuda, 6; Cuba, 11,720; Mexico, 160,773.....	172,499
Strawberry.....do.....	Mexico, 4,316.....	4,316
Sweetpotato ¹ do.....	China, 7,461.....	7,461
Swiss chard.....do.....	Mexico, 3,949.....	3,949
Tamarind bean pod.....do.....	Antigua, 70,531; Barbados, 8,008; Cuba, 810; India, 40,320; Mexico, 2,459; St. Lucia, 12,800.....	134,928
Tomato.....do.....	Bermuda, 1; Cuba, 29,009,614; Dominican Republic, 100; Egypt, 3,735; Mexico, 14,367,151; Virgin Islands, 177,702.....	43,498,303
Turnip.....do.....	Mexico, 324,520; Newfoundland, 33,020.....	357,540
Vaccinium (cranberry, etc.):		
Natural.....do.....	Estonia, 205; Newfoundland, 643,493; Norway, 535.....	644,293
Frozen.....do.....	Newfoundland, 3,416,220.....	3,416,220
Water caltrop.....do.....	China, 15,530; Japan, 15.....	15,545
Waterchestnut.....do.....	China, 1,888,802.....	1,888,802
Watercress.....do.....	Mexico, 5,007.....	5,007
Waterlily root.....do.....	China, 18,828; Cuba, 40,946.....	59,774
Waterlily seed pod.....do.....	Cuba, 166.....	166
Watermelon.....do.....	Cuba, 218,520; Mexico, 1,312,647.....	1,531,167
Yam ¹ do.....	China, 26,896; Japan, 15,740.....	42,636
Yam bean root.....do.....	China, 19,810; Mexico, 531.....	20,341

¹ These sweetpotatoes and yams were imported into Hawaii. Although the importation of sweetpotatoes and yams into continental United States is prohibited by quarantines 29 and 30, that prohibition does not apply to Hawaii or Puerto Rico.

TABLE 29.—*Fruits and vegetables imported fiscal year 1934, by ports of entry*

[Imported under Quarantine No. 56 unless otherwise designated]

Kind	Port and quantity	Total
Apple.....pounds	Detroit, 4; New York, 226,002	226, 006
Apricot.....do	New York, 288	288
<i>Aralia cordata</i> do	Los Angeles, 168; Hawaii (all ports), 977	1, 145
Arrowhead.....do	Boston, 9,000; Buffalo, 16,400; Hawaii (all ports), 27,770; Los Angeles, 3,000; New York, 28,600; Niagara Falls, 7,000; Portland, 1,000; San Francisco, 71,300; Seattle, 10,188.	174, 258
Asparagus.....do	New York, 57,656; San Ysidro, 70	57, 726
Avocado.....do	Boston, 240; Brownsville (seeds removed), 5,327; Douglas (seeds removed), 961; Eagle Pass (seeds removed), 5,606; El Paso (seeds removed), 5,669; Hidalgo (seeds removed), 912; Key West, 806,631; Laredo (seeds removed), 2,221; Mercedes (seeds removed), 672; Miami, 28,026; Naco (seeds removed), 10; New Orleans, 2,069,107; New York, 1,901,404; Nogales (seeds removed), 3,417; Puerto Rico (all ports), 10; Rio Grande City (seeds removed), 106; Roma (seeds removed), 285; Tampa, 1,312.835; Ysleta (seeds removed), 1.	6, 143, 440
Balsamapple.....do	Calexico, 1,013; New York, 13,026	14, 039
Banana.....bunches	Baltimore, 2,189,501; Blaine, 2,912; Boston, 3,053,000; Brownsville, 24,035; Buffalo, 425; Charleston, 1,040,446; Corpus Christi, 4,679; Detroit, 425; Eagle Pass, 8,927; Eastport, 2; El Paso, 235,377; Fort Covington, 425; Galveston, 2,334,944; Jacksonville, 444,655; Key West, 136; Laredo, 234,005; Los Angeles, 1,445,813; Miami, 188,662; Mobile, 1,828,609; New Orleans, 10,428,400; New York, 11,823,016; Nogales, 20,634; Norfolk, 194,729; Philadelphia, 4,103,848; Port Huron, 415; Puerto Rico (all ports), 6,631; San Francisco, 1,448,800; Sault Ste. Marie, 2,390; Seattle, 56,851; Sumas, 20,711; Tampa, 465,474.	41, 608, 877
Bean (green):		
Faba.....pounds	Calexico, 27; Nogales, 55	82
Lima.....do	Calexico, 3; El Paso, 34; Laredo, 30,837; New York, 3,605,265; Nogales, 18,123.	3, 654, 262
String.....do	Brownsville, 801; Calexico, 1,669; Douglas, 1,328; Eagle Pass, 4,743; El Paso, 100,715; Laredo, 571,817; Naco, 317; New York, 259; Nogales, 529,681; San Ysidro, 8,869.	1, 220, 199
Beet.....do	Calexico, 2,250; Douglas, 596; Eagle Pass, 655; El Paso, 253,496; Naco, 15; New York, 2,520; Nogales, 9,007.	268, 539
Berry (<i>Rubus</i>).....do	New York, 494	494
Breadfruit.....do	New York, 32	32
Brussels sprouts.....do	Calexico, 1	1
Burdock.....do	Hawaii (all ports), 50; Los Angeles, 500.	550
Cabbage.....do	Calexico, 721; Douglas, 4,009; Eagle Pass, 678; El Paso, 945; Laredo, 2,195; Naco, 246; New York, 399,010; Nogales, 18,562; San Ysidro, 30; Ysleta, 2.	426, 398
Cacao bean pod.....do	New York, 577	577
Carrot.....do	Calexico, 2,834; Douglas, 594; Eagle Pass, 1,487; El Paso, 381,205; Naco, 88; New York, 20; Nogales, 23,813; San Ysidro, 15.	410, 056
Cassava.....do	Chicago, 100; Key West, 3,830; New York, 113,706; Puerto Rico (all ports), 33; San Francisco, 200; Seattle, 1,100; Tampa, 2,880.	121, 849
Cauliflower.....do	Calexico, 110; Douglas, 97; Eagle Pass, 75; Nogales, 1,330; San Ysidro, 2.	1, 614
Celery.....do	Calexico, 20; Nogales, 5	25
Chayote.....do	El Paso, 2,440; Key West, 898; Laredo, 740; New Orleans, 45; New York, 9,941.	14, 064
Cherry:		
Dried, sour.....do	Boston, 51,723; New York, 859,083; Philadelphia, 236,420.	1, 147, 226
Fresh.....do	New York, 4,663	4, 663
Chinese watermelon.....do	New York, 5,576	5, 576
Cipollino.....do	Boston, 44,069; New York, 2,253,679; Philadelphia, 34,228.	2, 331, 976
<i>Citrus medica</i> do	Detroit, 136; New York, 28,290	28, 426
Clover top.....do	Douglas, 191; Nogales, 2	193
Coriander.....do	Calexico, 287	287
Cowpea.....do	Calexico, 19; Naco, 5	24
<i>Crescentia alata</i> do	Nogales, 190	190
Croscnes.....do	New York, 397	397
Cucumber.....do	Calexico, 330; Douglas, 485; Eagle Pass, 52; El Paso, 1,800; Key West, 1,850; Laredo, 1,665; Miami, 4,501; Naco, 12; New York, 1,426,299; Nogales, 3,152; Tampa, 3,235; San Ysidro, 6.	1, 443, 387

TABLE 29.—*Fruits and vegetables imported fiscal year 1934, by ports of entry—Con.*

Kind	Port and quantity	Total
Dasheen (includes colocasia, inhame, malanga, taro, and yautia).....pounds..	Boston, 170,166; Buffalo, 8,080; Calexico, 2,399; Key West, 10,323; Los Angeles, 20,200; New York, 1,004,665; Niagara Falls, 14,635; Portland, 7,092; Providence, 97,847; Puerto Rico (all ports), 749,239; San Francisco, 350,664; San Ysidro, 10; Seattle, 88,844; Tampa, 35,822.	2,559,986
Eggplant.....do.....	Calexico, 29; Douglas, 25; El Paso, 4,898; Laredo, 2,226; Los Angeles, 504; Miami, 550; New Orleans, 100,575; New York, 3,514,145; Nogales, 131,432.	3,754,384
Endive.....do.....	New York, 786,695.	786,695
Garbanzo.....do.....	Nogales, 25.	25
Garlic.....do.....	Boston, 292,228; Brownsville, 4,909; Calexico, 139,259; Douglas, 2,269; Eagle Pass, 31,805; El Paso, 21,283; Hawaii (all ports), 1,780; Laredo, 402,201; Mercedes, 4; Mobile, 1,653; Naco, 760; New Orleans, 132,858; New York, 3,635,774; Nogales, 4,990; Philadelphia, 67,200; Providence, 12; Puerto Rico (all ports), 1,816,619; San Ysidro, 3,906; Ysleta, 1.	6,559,511
Ginger (crude).....do.....	Boston, 10,240; Buffalo, 12,979; Calexico, 24; Hawaii (all ports), 913; Key West, 52; Los Angeles, 15,100; New York, 98,571; Niagara Falls, 19,794; Portland, 800; Puerto Rico (all ports), 10; San Francisco, 219,368; Seattle, 16,880.	394,731
Grape:		
Fresh (not hothouse).....do.....	Brownsville, 25; Calexico, 157; Eagle Pass, 160; El Paso, 55; Laredo, 60; New York, 11,292,271; Nogales, 60.	11,292,788
Hothouse.....do.....	New York, 78,093.	78,093
Processed.....do.....	New York, 48,982.	48,982
Grapefruit.....do.....	Boston, 660; Key West, 380,650; New Orleans, 286,570; New York, 1,546,736; Seattle, 72,760.	2,287,376
Horseradish.....do.....	Hawaii (all ports), 125; New York, 28,909.	29,034
Husk tomato.....do.....	Calexico, 41; Eagle Pass, 159; El Paso, 5,254; Laredo, 1,493; San Ysidro, 18.	6,965
Japanese horseradish.....do.....	Hawaii (all ports), 852.	852
Kale.....do.....	Calexico, 18; New York, 223,940.	223,958
Kohlrabi.....do.....	Calexico, 34.	34
Kudzu.....do.....	Boston, 3,610; Buffalo, 6,500; Los Angeles, 1,600; New York, 8,485; Niagara Falls, 5,520; Portland, 200; San Francisco, 34,311; Seattle, 1,630.	61,856
Leek.....do.....	Calexico, 6.	6
Lemon.....do.....	Boston, 24; Calexico, 12; Eagle Pass, 112; New Orleans, 680,500; New York, 3,125,176; Norfolk, 375; Providence, 12.	3,806,211
Lettuce.....do.....	Calexico, 1,268; Douglas, 3,220; Eagle Pass, 2,542; El Paso, 1,030; Naco, 403; Nogales, 27,103.	35,566
Lily bulb (edible).....do.....	Boston, 1,600; Buffalo, 1,760; Hawaii (all ports), 1,520; Los Angeles, 100; New York, 5,160; Niagara Falls, 1,760; San Francisco, 11,328; Seattle, 1,074.	24,302
Lime (sour).....do.....	Baltimore, 305; Boston, 19,443; Brownsville, 81,214; Buffalo, 4,893; Del Rio, 64; Eagle Pass, 530,767; El Paso, 120,199; Hidalgo, 1,020; Key West, 40; Laredo, 3,221,781; Los Angeles, 695,089; Mercedes, 3; Miami, 405; New Orleans, 9,565; New York, 1,795,995; Nogales, 6,248; Norfolk, 130; Philadelphia, 1,575; Puerto Rico (all ports), 745; San Francisco, 36,727.	6,526,208
Litchi fruit (in brine).....do.....	Portland, 20.	20
Mango (seeds removed, frozen).....do.....	Los Angeles, 7,256; New York, 101,847; Portland, 834; San Francisco, 3,321; Seattle, 1,150.	114,408
Melon.....do.....	Brownsville, 172; Calexico, 2,426; Douglas, 39; Eagle Pass, 7,952; El Paso, 660; Hidalgo, 1,540; Laredo, 2,064,595; Mercedes, 37; Naco, 10; New York, 5,863,196; Nogales, 5,630; Rio Grande City, 4; San Ysidro, 45.	7,946,306
Mint.....do.....	Calexico, 4; El Paso, 15; Nogales, 5.	24
Mustard.....do.....	Calexico, 24,738; Douglas, 366; El Paso, 71,478; New York, 2,939; Nogales, 6,219.	105,740
Nectarine.....do.....	New York, 305,769.	305,769
Nopale.....do.....	El Paso.	15
Nuts:		
Acorn.....do.....	New York, 23,414,830; Norfolk, 2,011,184.	25,426,014
Chestnut.....do.....	Boston, 27,340; Hawaii (all ports), 124,690; Los Angeles, 187,090; New York, 12,229,577; Niagara Falls, 79,750; Seattle, 48,890; San Francisco, 490,964.	13,188,301
Okra.....do.....	Calexico, 22; El Paso, 950; Key West, 30,121; Laredo, 36,395; Miami, 3,570; New Orleans, 464,300; New York, 515,855; Tampa, 341,860.	1,393,073

¹ Okra was admitted from Tamaulipas, Mexico, through the port of Laredo under special conditions.

TABLE 29.—*Fruits and vegetables imported fiscal year 1934, by ports of entry—Con.*

Kind	Port and quantity	Total
Onion.....pounds..	Boston, 801,428; Brownsville, 7; Calexico, 14,041; Douglas, 10,954; Eagle Pass, 9,246; El Paso, 43,599; Hawaii (all ports), 2,500; Naco, 2,730; New York, 3,900,289; Nogales, 30,789; Providence, 30; Puerto Rico (all ports), 50; San Francisco, 47,447; San Ysidro, 49; Seattle, 18,400; Ysleta, 7.	4, 881, 566
Orange:		
Under Quarantine No. 56.....do....	Boston, 960; Key West, 160; New Orleans, 33,995; New York, 510.	35, 625
Mandarin (Quarantine No. 28).do....	Portland, 182,250; Seattle, 1,316,790	1, 499, 040
Papaya:		
Natural.....do....	New York, 7,910	7, 910
Frozen.....do....	New York, 88	88
Parsley.....do....	Calexico, 73; Douglas, 78; El Paso, 17,354; Naco, 53; New York, 3,040; Nogales, 24.	20, 622
Parsnip.....do....	New York, 20; Nogales, 5	25
Pea.....do....	Calexico, 407; Douglas, 1,274; Eagle Pass, 82; El Paso, 315; Laredo, 110; Naco, 24; New York, 1,951; Nogales, 4,699,152; San Ysidro, 170,881.	4, 874, 196
Peach:		
Fresh.....do....	New York, 194,201	194, 201
Hothouse.....do....	New York, 10	10
Pear.....do....	New York, 20,535	20, 535
Pepper.....do....	Brownsville, 3,389; Calexico, 2,362; Del Rio, 664; Douglas, 10,010; Eagle Pass, 46,471; El Paso, 273,356; Hidalgo, 443; Key West, 1,075; Laredo, 110,788; Los Angeles, 34,720; Mercedes, 18; Miami, 1,215; Naco, 1,905; New Orleans, 108,555; New York, 1,649,184; Nogales, 776,269; Presidio, 317; Rio Grande City, 10; San Francisco, 4,840; San Ysidro, 304; Ysleta, 29.	3, 025, 924
Peppermint.....do....	New York, 119	119
Pigeonpea.....do....	New York, 145	145
Pigweed.....do....	Douglas, 351; Nogales, 234	585
Pineapple.....crates	Brownsville, 1,016; Detroit, 20; Douglas, 1; Eagle Pass, 112; El Paso, 6,953; Hidalgo, 55; Key West, 352,482; Laredo, 20,215; Los Angeles, 97; Miami, 2,621; Naco, 1; New Orleans, 56,143; New York, 203,723; Nogales, 32; Portland, 104; Providence, 6; San Francisco, 463; Seattle, 11; Tampa, 8,988.	653, 043
Plantain.....pounds..	Jacksonville, 350; Key West, 267,622; Miami, 142,095; Mobile, 190; New Orleans, 482,040; New York, 3,602,597; Pensacola, 1,000; Philadelphia, 92,820; Puerto Rico (all ports), 9,273,379; San Francisco, 2,250; Tampa, 592,447.	14, 456, 790
Plum.....do....	New York, 86,714	86, 714
Potato:		
Under Quarantine No. 56.....pounds..	New York, 1,667,156	1, 667, 156
Under potato regulations (order of Dec. 22, 1913).....pounds..	Douglas, 93,059; Naco, 3,031; New York, 2,215,551; Nogales, 51,168; Puerto Rico (all ports), 297,281.	2, 660, 090
Pricklypear.....do....	Calexico, 47; El Paso, 1,253; Laredo, 290; Nogales, 27.	1, 617
Pumpkin.....do....	Calexico, 2,086; Douglas, 3,051; Eagle Pass, 2,954; Hidalgo, 3,000; Key West, 5,699; Laredo, 6,509; Mercedes, 40; Naco, 630; New York, 120,691; Nogales, 1,034; Puerto Rico (all ports), 24,802; Rio Grande City, 38; Roma, 76; Tampa, 200; San Ysidro, 155.	170, 965
Purslane.....do....	Calexico, 666; Douglas, 121; Nogales, 923	1, 710
Radish.....do....	Calexico, 2,563; Douglas, 52; Eagle Pass, 75; El Paso, 116,385; Nogales, 10,081; Ysleta, 2.	129, 158
St. Johns bread.....do....	New York, 1,259,693; Norfolk, 332,460; Philadelphia, 110,230.	1, 702, 383
Salsify.....do....	Calexico, 5; San Ysidro, 3,413	3, 418
Shallot.....do....	New York, 5,000	5, 000
Spinach.....do....	Calexico, 2,426; Douglas, 780; El Paso, 28,985; Naco, 105; Nogales, 22,144.	54, 440
Squash.....do....	Calexico, 3,971; Douglas, 10,162; Eagle Pass, 2,334; El Paso, 32,155; Laredo, 85,000; Mercedes, 261; Naco, 497; New York, 11,726; Nogales, 26,273; Rio Grande City, 10; San Ysidro, 110.	172, 499
Strawberry.....do....	El Paso, 4,315; San Ysidro, 1	4, 316
Sweetpotato.....do....	Hawaii (all ports), 7,461	7, 461
Swiss chard.....do....	El Paso, 3,949	3, 949
Tamarind bean pod.....do....	Boston, 300; Calexico, 13; Eagle Pass, 258; El Paso, 430; Laredo, 1,160; New York, 132,169; Nogales, 4; San Ysidro, 594.	134, 928
Tomato.....do....	Blaine, 18,900; Brownsville, 1,062; Buffalo, 44,750; Calexico, 7,015; Del Rio, 184; Douglas, 15,890; Eagle Pass, 93,845; El Paso, 166,888; Key West, 450,175; Laredo, 1,774,385; Los Angeles, 3,565,216; Mercedes, 71; Naco, 2,671; New Orleans, 1,159,979; New York, 27,174,173; Nogales, 8,214,512; Presidio, 69; Puerto Rico (all ports), 74,820; Rio Grande City, 8; Roma, 75; San Francisco, 733,485; San Ysidro, 126; Ysleta, 4.	43, 498, 303

TABLE 29.—*Fruits and vegetables imported fiscal year 1934, by ports of entry—Con.*

Kind	Port and quantity	Total
Turnip.....pounds..	Boston, 33,000; Calexico, 311; Douglas, 51; Eagle Pass, 120; El Paso, 317,109; Naco, 5; New York, 20; Nogales, 6,924.	357, 540
<i>Vaccinium</i> (cranberry, etc.):		
Natural.....do....	Boston, 15,500; Chicago, 149,000; New York, 297,943; Port Huron, 173,600; San Francisco, 8,250.	644, 293
Frozen.....do....	Boston, 1,123,590; Detroit, 108,000; New York, 1,728,090; Port Huron, 404,940; Sault Ste. Marie, 51,600.	3, 416, 220
Water caltrop.....do....	Boston, 300; Hawaii (all ports), 4,330; Los Angeles, 15; New York, 1,600; Niagara Falls, 300; San Francisco, 7,700; Seattle, 1,300.	15, 545
Waterchestnut.....do....	Blaine, 300; Boston, 50,420; Buffalo, 104,085; Chicago, 50,000; Detroit, 10,000; Hawaii (all ports), 110,913; Los Angeles, 102,100; New York, 276,840; Niagara Falls, 87,386; Portland, 11,000; San Francisco, 600,280; Seattle, 485,478.	1, 888, 802
Watercress.....do....	Calexico, 65; Douglas, 300; Eagle Pass, 5; Naco, 21; Nogales, 4,616.	5, 007
Waterlily root.....do....	Hawaii (all ports), 50; New York, 40,946; Niagara Falls, 200; Portland, 1,298; San Francisco, 6,160; Seattle, 11,120.	59, 774
Waterlily seed pod.....do....	New York, 166.	166
Watermelon.....do....	Brownsville, 49,860; Calexico, 1,061,027; Douglas, 1,515; Eagle Pass, 141; El Paso, 12,500; Hidalgo, 139,750; Key West, 1,800; Laredo, 4,100; Mercedes, 253; Miami, 2,500; Naco, 230; New Orleans, 26,010; New York, 188,210; Nogales, 39,293; Rio Grande City, 158; Roma, 1,600; San Ysidro, 2,220.	1, 531, 167
Yam.....do....	Hawaii (all ports), 42,636.	42, 636
Yam bean root.....do....	El Paso, 470; Hawaii (all ports), 1,910; Laredo, 60; Los Angeles, 1,000; New York, 700; Nogales, 1; San Francisco, 16,200.	20, 341

PLANTS AND PLANT PRODUCTS ENTERED FOR EXPORTATION OR FOR
TRANSPORTATION AND EXPORTATION

In addition to the regulated imports for consumption entry recorded in tables 16 to 29, this Bureau supervised the entry under permit, either for exportation or for transportation and exportation, of considerable quantities of plants and plant products, as follows: Flower bulbs, corms, and tubers, 397,113; fruit trees, 30,452; cacti and succulents, 2,489; orchids, 1,140; miscellaneous plants, 11,478; miscellaneous seeds, 299 pounds; apples, 10,161 pounds; avocados, 1,936 pounds; beans, lima, 800 pounds; beans, string, 9,254 pounds; cauliflowers, 42 pounds; chestnuts, 20,421 pounds; *Citrus medica*, 100 pounds; cucumbers, 22,450 pounds; eggplants, 57,250 pounds; garlic, 1,230,175 pounds; ginger root, 380 pounds; grapes, 191,080 pounds; grapefruit, 11,423,885 pounds; kudzu, 100 pounds; lemons, 5,154,290 pounds; lily bulbs (edible), 1,200 pounds; limes, sour, 8,525 pounds; melons, 704 pounds; okra, 700 pounds; onions, 10,799,862 pounds; oranges, 1,381,414 pounds; peas, 397,579 pounds; peppers, 90,778 pounds; pineapples, 125,005 crates; potatoes, 10,511 pounds; sweetpotatoes, 1,000 pounds; tamarind bean pods, 15,320 pounds; tangerines, 2,480 pounds; tomatoes, 15,752,989 pounds; waterchestnuts, 1,210 pounds; waterlily root, 439 pounds; broomcorn, 910 bales; brooms made of broomcorn, 1,200; corn, shelled, 1,285,602 pounds; cotton, 62,728 bales, including 1,421 bales of linters and 31 packages; cotton waste, 267 bales and 5 packages; cottonseed cake, 1,422,000 pounds; cottonseed meal, 186,412 pounds; seed or paddy rice, 403,488 pounds; rice straw, 15 bales; and wheat, 5,500 pounds.

MARITIME-PORT INSPECTION

SHIP INSPECTION

Ships from foreign countries and from Hawaii and Puerto Rico are inspected promptly upon arrival for the presence of restricted or prohibited plant material.

The inspection at ports in California, Florida, Hawaii, and at certain ports in Puerto Rico has been performed by State and Territorial officials serving as collaborators of the Bureau of Plant Quarantine.

A record by ports of the ship inspection appears in table 30.

TABLE 30.—Ships inspected, fiscal year 1934—Continued

BUREAU OF PLANT QUARANTINE

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Port	From Hawaii						From Puerto Rico				From United States ports via Canal		
	Direct			Via United States ports			Direct		Via United States ports		Ar-rived	In-spected	With contra-band
	Ar-rived	In-spected	With contra-band	Ar-rived	In-spected	With contra-band	Ar-rived	In-spected	With contra-band	Ar-rived			
Baltimore.....	3	3	1	17	17	3	3	3	2	26	204	200	20
Bellingham.....				1	1	0					7	3	0
Boston.....				13	13	0	19	19	9	1	262	262	0
Charleston.....							9	9	4	6	39	39	5
Corpus Christi.....							1	1	0	1	17	17	0
Galveston.....							7	7	1	7	12	12	2
Honolulu ³											112	112	0
Houston.....	10	10	0	2	2	0	20	20		11	122	122	4
Jacksonville ³							5	5	0	9	42	42	0
Key West ³											1	1	0
Miami ³							8	6	1		3	3	1
Mobile.....				3	3		10	10	8	32	63	63	0
New Orleans.....	15	15	9	13	13	0	31	31	3	34	62	62	4
Newport News ³											5	0	0
New York.....	2	2	1	35	31	5	124	123	96	36	263	219	4
Norfolk.....				1	1	0	5	5	0	21	103	103	4
Pensacola ³													
Philadelphia.....	3	3	0	20	20	1	53	53	40	3	212	206	12
Port Arthur ⁴							8	7	1		9	6	0
Portland, Ore.....	1	1	0	4	4	1					393	393	0
Puerto Rico (all ports).....											26	26	9
San Diego ³	3	3	1							1	104	104	6
San Francisco ³	152	152	19	12	12	5					551	551	5
San Pedro ³	46	46	7	29	29	2	1	1	0		946	946	15
Savannah.....				1	1	0	6	6	5	1	33	33	3
Seattle.....	6	6	2	12	12	0					130	130	8
Tampa ³							31	31	1				
Total.....	241	241	40	163	159	17	341	337	172	191	3,721	3,652	102

¹ Work handled by inspector stationed at Savannah, Ga.² Work handled by inspectors stationed at Mobile, Ala.³ Collaborators stationed at these ports.⁴ Includes ships arriving at Beaumont and Sabine, Tex., and Lake Charles, La.⁵ Work handled by inspectors stationed at Boston, Mass.

NOTE.—The foreign-ship arrivals do not in all cases agree with customs figures. Foreign ships may put in for bunkers and be inspected by inspectors of the Bureau of Plant Quarantine but not entered by Customs. On the other hand, ships entered at certain small subports are included in Customs records but not in this report.

CARGO INSPECTION

All importations of plants and plant products subject to plant-quarantine restrictions were inspected at the port of entry or the port of first arrival. A record of such importations by ports appears in table 31.

TABLE 31.—*Inspection of shipments of plants and plant products offered for entry, fiscal year 1934*

Port	Shipments inspected and entered under permit	Shipments refused entry	Port	Shipments inspected and entered under permit	Shipments refused entry
Baltimore.....	209	0	Naco.....	3	0
Bellingham.....	71	0	New Orleans.....	1,568	1
Blaine.....	68	0	New York.....	10,292	23
Boston.....	1,529	0	Nogales.....	1,576	0
Brownsville.....	455	0	Norfolk.....	270	0
Buffalo.....	330	2	Pensacola ¹	1	0
Calexico.....	165	0	Philadelphia.....	445	8
Charleston.....	134	0	Port Arthur.....	1	0
Chicago.....	30	1	Port Huron ¹	75	1
Corpus Christi.....	2	0	Portland, Oreg.....	44	0
Del Rio.....	15	0	Presidio.....	338	0
Detroit.....	278	6	Providence ²	13	0
Douglas.....	20	0	Puerto Rico (all ports).....	515	0
Eagle Pass.....	729	0	Rio Grande City.....	42	0
El Paso.....	5,098	0	Roma.....	50	0
Fabens.....	73	0	San Diego ¹	1	0
Galveston.....	376	0	San Francisco ¹	1,009	10
Hidalgo.....	110	0	San Pedro ¹	607	4
Honolulu ¹	340	52	San Ysidro.....	90	0
Houston.....	203	1	Sasabe.....	1	0
Jacksonville ¹	44	0	Savannah.....	106	1
Key West ¹	547	0	Seattle.....	304	1
Laredo.....	2,884	0	Tampa ¹	609	1
Mercedes.....	512	0			
Miami ¹	80	0			
Mobile.....	71	0	Total.....	32,333	112

¹ Collaborators are stationed at these ports.

² Work handled by inspectors stationed at Boston, Mass.

In addition to the importations credited to the Mexican border ports there were several thousand importations which were so small that no duty was assessed by customs and no entry made.

Disinfection is required as a condition of entry of certain commodities and of other commodities when inspection reveals the presence of injurious insects or plant diseases. The following plant material was treated under the supervision of inspectors of this Bureau during the fiscal year: Cotton, 137,506 bales; cotton linters, 2,997 bales; cotton samples, 672; cotton waste, 41,426 bales; bagging, 1,868 bales; chestnuts, 10,864 cases; tree seeds, 39 bags, 207 packages, and 24 cases; broomcorn, 345 bales; miscellaneous plants, 219 lots; narcissus bulbs imported under special permit, 183,304; and bulbous iris, 78,506.

It has also been necessary to devote considerable time at several ports to the inspection of miscellaneous cargoes in order to establish the true status of the importations and to supervise the cleaning by importers of shipments containing prohibited packing material or contaminated with objectionable material such as soil.

AIRPLANE INSPECTION

Three thousand and fifty-one airplanes arriving from foreign countries were inspected during the fiscal year. The inspections were made at the ports of Brownsville, El Paso, and Laredo, Tex.; Nogales, Ariz.; Calexico, San Diego, and Los Angeles, Calif.; Miami, Tampa, and West Palm Beach, Fla.; Seattle, Wash.; and San Juan, P. R. A total of 923 interceptions of prohibited plant material was made.

FOREIGN PARCEL-POST INSPECTION

Through cooperation with customs and post-office officials, mail packages from foreign countries which are found to contain plants or plant products are referred to inspectors of this Bureau for examination. Such packages arriving at ports of entry where there are no representatives of this Bureau are forwarded by the postal officials to the nearest port at which a plant-quarantine inspector is stationed.

Table 32 indicates by ports the number and disposition of foreign-mail packages inspected during the fiscal year.

TABLE 32.—*Number of inspections of foreign parcel-post packages, fiscal year 1934*

Port	In- spected	Refused entry (entire or in part)	Divert- ed to Wash- ington	Port	In- spected	Refused entry (entire or in part)	Divert- ed to Wash- ington
Atlanta ¹	55	2	15	Mobile.....	1	1	0
Baltimore.....	925	42	63	Naco.....	65	0	0
Boston.....	3, 539	174	1, 476	New Orleans.....	127	25	39
Brownsville.....	704	4	0	New York.....	4, 266	579	835
Buffalo.....	48	26	7	Nogales.....	215	19	1
Chicago.....	4, 592	526	89	Philadelphia.....	7, 773	227	351
Detroit.....	3, 825	164	264	Portland, Oreg.....	16	9	8
Douglas.....	3	0	0	Presidio.....	3	0	0
Eagle Pass.....	218	3	0	Puerto Rico (all ports).....	6	3	0
El Paso.....	657	141	60	St. Paul ¹	5, 834	302	214
Honolulu ¹	573	25	2	San Diego ¹	24	1	0
Jacksonville ¹	457	61	108	San Francisco ¹	4, 501	232	0
Key West ¹	1	0	1	Seattle.....	1, 891	128	0
Laredo.....	146	21	5				
Los Angeles ^{1 2}	4, 482	147	1	Total.....	44, 958	2, 871	3, 541
Miami ¹	11	9	2				

¹ Collaborators are stationed at these ports.

² 270 packages were diverted to San Francisco for treatment.

MEXICAN-BORDER SERVICE

The movement of railway cars showed a decided increase over that during the last fiscal year. A total of 17,592 freight cars was inspected in the Mexican railway yards. Of these 16,415 entered the United States, 5,408 being fumigated as a condition of entry. Seven hundred and eighty-six cars were found to be contaminated with cottonseed. Cleaning was required as a condition of entry. The usual fee of \$4 was collected for each car fumigated, and all fees collected were covered into the Treasury as miscellaneous receipts.

A summary of the railway-car inspection and fumigation is given in table 33.

TABLE 33.—*Inspection and fumigation of railway cars crossing the border from Mexico, fiscal year 1934*

Port	Cars in- spected	Cars with cottonseed	Cars en- tered	Cars fumi- gated	Fees col- lected
	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Dollars</i>
Brownsville.....	262	33	246	16	64
Douglas.....	509	7	509	21	84
Eagle Pass.....	1, 886	127	1, 770	613	2, 300
El Paso.....	3, 672	191	3, 350	1 960	4, 568
Laredo.....	7, 131	265	6, 721	2, 861	11, 160
Naco.....	660	38	660	1	4
Nogales.....	3, 410	107	3, 097	904	3, 600
Presidio.....	62	18	62	43	172
Total.....	17, 592	786	16, 415	5, 419	2 21, 952

¹ Includes 11 cars not from Mexico.

² The apparent discrepancy in fees collected and the number of cars fumigated may be explained by the fact that it is customary for the railroads to purchase fumigation coupons in advance.

In addition to the freight cars listed in table 33, 2,650 Pullman and passenger coaches crossed the border and were inspected.

Plant-quarantine inspectors on the Mexican border take an active part, in cooperation with the Customs Service, in the inspection of vehicles, baggage, personal effects, and express packages from Mexico. Approximately 4,000,000 vehicles crossed the border from Mexico during the fiscal year, and 136,691 pieces of baggage were examined. The inspection of these vehicles and baggage resulted in the interception of a large quantity of prohibited plant material. A record of such interceptions appears in table 38.

INSPECTION IN PUERTO RICO AND HAWAII

In addition to the enforcement of the foreign-plant quarantines and regulatory orders, inspectors stationed in Puerto Rico also enforce the provisions of Quarantine No. 58. This involves the inspection of fruits and vegetables in the fields, in packing houses, and on the docks, and all shipments of such products moving to the mainland have been certified as free from pests.

Parcel-post packages originating on the island and destined for points on the mainland are also inspected. Eight hundred and twelve such packages were inspected, and seventy-five were found to contain prohibited plant material and were returned to the sender.

A record by months of the amounts of fruits and vegetables inspected and certified for shipment to the mainland appears in table 34.

TABLE 34.—Summary of shipments of fruits and vegetables moving from Puerto Rico to the mainland, inspected and certified under Quarantine No. 58, fiscal year 1934

Item	Inspected and certified during—											Total	
	July	August	Septem-ber	October	Novem-ber	Decem-ber	January	February	March	April	May		June
Avocados.....		100		2,700	1,760								4,560
Bananas.....				2	19	1							22
Breadfruit.....			160	40	1,090	3,460	5,310	4,395	240	400	1,000	1,104	17,199
Cabbage.....													60
Celery.....													90
Chayotes.....		55	920	3,620	4,700	7,425	4,670	7,164	5,830	1,860	4,785	4,960	45,979
Citrus.....									6,000				6,000
Cucumbers.....			120	10,920	82,620	1,030,260	807,600	615,540	234,180	147,360	2,280		2,930,880
Cucumbers (Angola).....					115	100					60		335
Dasheens.....			300		300	3,460	3,360	8,640	17,200	2,780	1,440		6,780
Eggplants.....					300	3,460	3,360	8,640	17,200	18,720	800		52,480
Ginger root.....		8,800	320	680		5,400	3,205	1,440	1,200	4,940	4,480	8,840	44,905
Grapefruit.....	106,560	703,260	11,409,660	3,554,460	1,973,700	1,458,090	1,405,080	1,327,140	2,572,200	3,216,150	5,615,610	2,848,140	36,190,050
Lemons.....			900	180		90							2,230
Leranes.....						240	300					2,880	4,720
Lettuce.....													175
Lima beans.....					50		1,855		35				1,975
Limes.....	3,060	7,290			6,840	1,980	1,530	900	2,520	1,260	1,350	15,060	45,840
Malangas.....			3,150	900		600		365	400	2,000		1,680	7,645
Mixed fruits and vegetables.....				2,600	690	7,120	1,330	720	1,680	540		60	12,340
Onions.....			110										750
Oranges.....	90		4,050	194,760	460,450	179,280	85,590	155,250	203,130	95,940	178,920	8,820	1,566,280
Oranges (sour).....		90					90		810	270	900		2,250
Papayas.....		1,020	530		1,200	360	1,540	1,082	420	620		1,500	8,272
Parsley.....		490	425	450	525	1,005	435	605		815	475		5,925
Peas (garden).....						4,225	435	225	6,230	3,445			14,560
Peppers.....		850	1,005	560	175	740	10,905	10,510	18,510	14,665	3,325	750	62,645
Peppers (small).....					675		2,920	395	119	255	375	575	9,249
Pigeonpeas.....					12,965	55,125	33,415	52,265	20,290				176,060
Pineapples.....		33,575	5,462	1,155	1,186	1,777	1,704	11,045	89,517	68,734	106,336	45,792	370,507
Pineapples.....			923	495	614	1,211	546	2,417	13,090	13,527	15,074	6,185	53,082
Plantains.....					60				7				67
Potatoes.....													9,750
Pumpkins.....	2,720	1,280	4,710	11,120	19,195	4,720	12,230	36,200	21,350	5,870	10,285	19,730	143,410
Quenepas.....	1,440	4,500	3,000										9,090
Squash.....					570	26,260	23,640	49,380	9,720	180			109,750
String beans.....						70	3,640	3,010	105				6,825
Sweet corn.....							50						50
Tamarinds.....										280	160	960	1,400
Tangerines.....					18,460		90						34,300
Tomatoes.....					15,750	270	9,000	22,150	47,700	18,650			97,830
Watermelons.....					15,580	270	18,780		720				35,080
Yuca.....													270
Certificates.....	173	133	318	170	261	199	195	242	280	242	259	270	2,742

Inspectors stationed in Hawaii are engaged principally with the enforcement of Quarantine No. 13 on account of the Mediterranean fruit fly and the melon fly. Inspections were made in the fields, in packing sheds, and on the docks of such fruits and vegetables as are permitted to move to the mainland.

Parcel-post packages originating in the Hawaiian Islands and destined for points on the mainland are also inspected. A total of 75,365 packages was opened and examined, 82,884 packages were inspected without being opened, and 63 packages were found to contain prohibited plant material.

The practice of inspecting and sealing baggage as an accommodation to travelers between Hawaii and the mainland has been continued. During the year 2,061 pieces of baggage were inspected and sealed under this arrangement.

A record of the amounts of fruits and vegetables inspected and certified for shipment from Hawaii to the mainland appears in table 35.

In both Hawaii and Puerto Rico insular plant-quarantine inspectors rendered valuable assistance in the enforcement of foreign-plant quarantines and regulatory orders.

TABLE 35.—*Fruits and vegetables inspected and certified for shipment from Hawaii to the mainland, fiscal year 1934*

Month	Bananas	Pine-apples	Taro	Coco-nuts	Ginger root	Lily root ¹	Potatoes	Permits issued
	<i>Bunches</i>	<i>Crates</i>	<i>Pounds</i>	<i>Number</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Pounds</i>	<i>Number</i>
July.....	7, 148	4, 365	5, 660	1, 755	4, 410	30, 750	-----	165
August.....	9, 591	3, 695	5, 400	8, 030	10, 536	19, 950	-----	157
September.....	8, 755	2, 665	4, 580	1, 856	6, 605	17, 400	-----	101
October.....	7, 873	4, 037	7, 215	35	4, 358	23, 025	-----	91
November.....	6, 880	1, 040	900	33	12, 260	26, 700	-----	91
December.....	8, 725	2, 238	160	13, 827	4, 700	37, 615	9, 889	130
January.....	7, 965	1, 975	1, 170	8, 239	1, 330	24, 100	16, 290	108
February.....	5, 858	1, 884	-----	866	14, 050	14, 650	21, 990	120
March.....	9, 042	1, 920	2, 725	4, 019	11, 810	14, 300	843, 377	155
April.....	7, 248	3, 200	1, 660	363	20, 300	25, 500	187, 400	154
May.....	5, 244	1, 940	-----	80	3, 120	12, 900	-----	101
June.....	3, 809	2, 360	1, 050	154	5, 840	18, 300	-----	120
Total.....	88, 138	31, 319	30, 520	39, 257	99, 319	265, 190	1, 078, 946	1, 493

¹ This edible root (*Nelumbium nelumbo*) is also known to the trade as lotus root.

INSPECTION OF SPECIAL-PERMIT AND DEPARTMENTAL PLANT MATERIAL

As in previous years, all plants imported under special permit have been inspected at ports of entry designated for such material. A tabular record of special-permit importations is presented in tables 20 to 22, inclusive. The majority of such special-permit importations have been, as in former years, inspected at Washington, D. C., and these together with departmental importations and distributions from Washington, including domestic plants entering and leaving the District of Columbia, are inspected and certified for shipment at the Department inspection house, in the nursery, or in freight, express, or post offices. A summary of the inspections made at Washington, D. C., is given in table 36.

TABLE 36.—*Summary of plants and plant products offered for inspection in the District of Columbia, fiscal year 1934*

Material inspected	Foreign	Do-mestic	Fumi-gated	Other-wise treated	In-fested with insects	In-fected with diseases
Lots of seeds (departmental).....	2, 098	4, 194	2, 941	273	148	65
Plants, cuttings, bulbs, roots, rhizomes, etc. (departmental).....	11, 699	319, 627	4, 734	5, 012	1 460	1 459
Miscellaneous unclassified material, other than plants and seeds (departmental).....	47	539	142	5	12	9
Shipments of plants under regulation 14, Quarantine No. 37 (commercial).....	800	-----	172	66	245	185
Shipments of plants and plant products under regulations 3 and 15, Quarantine No. 37 (commercial).....	795	-----	381	94	63	67
Containers of domestic plants other than departmental (mail, express, freight, and truck).....	-----	9, 183	-----	1	-----	8
Shipments of plants by private individuals.....	-----	2, 988	8	42	49	41
Interceptions of plants and plant products referred to Washington.....	1, 861	-----	453	651	80	16
Cotton samples referred to Washington.....	11, 779	-----	11, 779	-----	-----	-----

¹ Lots.

An effort is made to inspect, in the field, plants imported under regulation 14 of Quarantine No. 37 during at least two growing seasons to determine their freedom from plant pests, particularly plant diseases, which may have escaped detection or which were in such an early stage of development as to make detection impossible at the initial inspection at the time of entry, prior to shipment to the field. Only the more recent of the importations shown in table 22 are still under the observation of the Department. Owing to a reduction in funds available for the purpose only a small number of importations, as compared with former years, were given the field inspection. On the basis of these inspections and of such information as was available from inspections of previous years a total of 12,612,146 plants, bulbs, etc., were released from further observation. This represents imported plant material and its increase produced during the two or more growing seasons it was under observation, which was found to be apparently free of important plant pests likely to become established in this country.

During the fiscal year 118 collections of plant pests, 66 of which were diseases and 52 insects, were sent in for verification and determination. Among the more interesting pests found were the following: Diseases—*Cryptosporium minimum* (second report for the United States) on *Rosa* sp., mosaic on *Colchicum* sp. and on *Cymbidium* sp., all in Pennsylvania, *Phomopsis rudis* on *Cobutea kesselringi* and *Laburnum watereri*, *Rhabdospora rudis* on *Laburnum alpinum*, and *Urocystis colchici* on *Colchicum autumnale*, all in Ohio, and *Uredo nigropunctata* on *Stanhopea* sp. in Maryland; insects—*Bregmatothrips iridis* (thrips) on iris, *Dialeurodes chittendeni* (whitefly) on rhododendron, *Eumerus* sp. (Syrphidae) in narcissus, *Furcaspis biformis* (Coccidae) on *Cattleya schroederiana*, *Lepidosaphes tuberculata* (Coccidae) on *Cymbidium* sp., and *Taeniothrips gladioli* (thrips) on gladiolus.

INSPECTION OF PLANT-INTRODUCTION AND PROPAGATING GARDENS

As heretofore, plants grown and distributed by the Bureau of Plant Industry from its plant-introduction and propagating gardens were inspected and certified prior to shipment. Plants shipped from Mandan, N. Dak., Coconut Grove, Fla., and Chico, Calif., were inspected by officials of the States concerned cooperating with this Bureau. Those distributed from Savannah, Ga., were examined by an inspector of this Bureau. Table 37 indicates the number of plants inspected and certified for distribution.

TABLE 37.—Number of plants, bud sticks, cuttings, tubers, roots, and shipments of seeds examined for distribution from plant-introduction and propagating gardens, fiscal year 1934

Station	Plants	Bud sticks, cuttings, tubers, and roots	Shipments of seeds
Bell.....	20, 943	772	5
Chico.....	11, 864	1, 754	49
Coconut Grove.....	5, 209	179	69
Savannah.....	45	133	-----
District of Columbia.....	3, 259	12, 502	6, 077
Mandan, N. Dak.....	250, 000	-----	-----
Beltsville.....	130	3, 140	-----
Total.....	291, 450	18, 480	6, 200

INTERCEPTIONS OF PROHIBITED PLANTS AND PLANT PRODUCTS

A record of the number of interceptions of prohibited plants and plant products made by inspectors and collaborators of the Bureau appears in table 38. Many of these interceptions were found to harbor insect pests and plant diseases, and many others, while showing no infestation or infection, must be considered potentially dangerous since they came from countries where pests not present in this country are known to occur. For example, 1,706 interceptions, representing 27,420 individual units, pounds, and containers of known hosts of the Mediterranean fruit fly from countries where that insect is reported to occur, were made.

Interceptions made at footbridges, ferries, and crossings at the Mexican and Canadian border ports have all been considered as having been taken from baggage.

TABLE 38.—*Number of interceptions of contraband plants and plant products, fiscal year 1934*

Port	In baggage	In cargo	In mail	In quarters	In stores
Baltimore.....	26	3	44	36	126
Bellingham.....	4	0	0	6	94
Blaine.....	1, 129	0	0	0	0
Boston.....	225	19	253	6	5
Brownsville.....	2, 668	0	4	0	0
Brunswick ¹	0	0	0	19	4
Buffalo.....	208	2	30	0	0
Calxico.....	1, 937	0	0	0	0
Charleston.....	0	1	0	59	19
Chicago.....	0	27	618	0	27
Corpus Christi.....	2	0	0	13	4
Del Rio.....	435	0	0	0	0
Detroit ²	251	7	214	0	6
Douglas.....	557	0	0	0	0
Eagle Pass.....	1, 800	0	3	0	0
El Paso.....	7, 122	0	144	0	0
Fabens.....	201	0	0	0	0
Galveston.....	2	0	0	44	17
Gulfport ³	5	0	0	2	6
Hidalgo.....	769	0	0	0	0
Honolulu ⁴	962	273	34	0	8
Houston.....	1	0	0	28	43
Jacksonville ⁴	1	0	61	12	25
Key West ⁴	195	0	0	56	3
Laredo.....	4, 080	0	9	0	0
Los Angeles ⁴	0	1	140	1	0
Mercedes.....	237	0	0	0	0
Miami ⁴	924	10	6	348	65
Mobile.....	8	1	1	53	49
Naco.....	76	0	0	0	0
New Orleans.....	477	15	7	614	87
New York.....	2, 510	550	627	132	29
Nogales.....	2, 425	0	14	0	0
Norfolk.....	7	2	0	78	20
Pensacola ⁴	0	0	0	8	27
Philadelphia.....	24	45	288	144	187
Port Arthur ⁵	0	0	0	8	19
Port Huron ⁴	92	1	0	0	0
Portland, Oreg.....	4	7	10	2	4
Presidio.....	152	0	0	0	0
Providence ⁶	64	0	0	0	0
Puerto Rico (all ports).....	146	0	0	7	0
Rio Grande City.....	72	0	0	0	0
Roma.....	349	0	0	0	0
St. Paul ⁴	0	0	324	0	0
San Diego ⁴	6	6	1	22	39
San Francisco ⁴	261	31	44	158	123
San Pedro ⁴	99	8	0	25	73
San Ysidro.....	4, 349	0	0	0	0
Sasabe.....	117	0	0	0	0
Savannah.....	0	0	0	59	15
Seattle.....	123	6	122	0	2
Tampa ⁴	14	1	0	21	31
West Palm Beach ⁴	0	0	0	13	1
Ysleta.....	184	0	0	0	0
Zapata ⁷	13	0	0	0	0
Total.....	35, 313	1, 021	2, 998	1, 974	1, 158

¹ Work handled by inspector stationed at Savannah, Ga.² Interceptions in baggage are recorded at 1 customs station only, and the number reported represents only part of the total for Detroit.³ Work handled by inspectors stationed at Mobile, Ala.⁴ Collaborators stationed at these ports.⁵ Includes interceptions made at Beaumont and Sabine, Tex., and Lake Charles, La.⁶ Work handled by inspectors stationed at Boston, Mass.⁷ Port closed Dec. 18, 1933.

PESTS INTERCEPTED

During the fiscal year the inspectors and collaborators of the Bureau collected from foreign plants and plant products insects belonging to 1,277 recognized species and others distributed among 1,071 genera and families, fungi and bacteria belonging to 166 recognized species, plant-parasitic nematodes belonging to 14 recognized species, and numbers of interceptions of diseases caused by fungi, bacteria, nematodes, or other agents that could be referred to family, genus, or

other group only. Many of these interceptions were of considerable economic or scientific importance.

A total of 25,305 interceptions of insects and plant diseases were made during the fiscal year 1934. A summary of these interceptions appears in table 39.

TABLE 39.—*Number of interceptions of insects and plant diseases made during the fiscal year 1934*

Port	Cargo		Stores		Baggage		Quarters		Mail		Total	
	In-sects	Dis-eases	In-sects	Dis-eases	In-sects	Dis-eases	In-sects	Dis-eases	In-sects	Dis-eases	In-sects	Dis-eases
Baltimore.....	349	27	179	255	9	9	33	21	0	16	570	328
Bellingham.....	21	27	11	3	0	0	1	0	0	0	33	30
Blaine.....	1	5	0	0	3	1	0	0	0	0	4	6
Boston ¹	148	98	337	264	94	32	17	7	81	38	677	439
Brownsville.....	14	0	1	0	141	1	56	0	0	0	212	1
Buffalo.....	15	238	0	0	0	0	0	0	3	6	18	244
Calexico.....	71	11	0	0	18	1	0	0	0	0	89	12
Charleston.....	371	0	32	88	0	0	1	0	0	0	404	88
Chicago.....	6	1	1	3	0	0	0	0	18	10	25	14
Corpus Christi.....	4	0	12	37	0	0	4	2	0	0	20	39
Del Rio.....	0	0	0	0	4	0	0	0	0	0	4	0
Detroit.....	37	36	0	6	2	0	0	0	30	23	69	65
Douglas.....	9	3	1	0	15	3	0	0	0	0	25	6
Eagle Pass.....	217	28	0	0	219	28	0	0	0	0	436	56
El Paso.....	44	27	0	0	120	138	0	0	8	4	172	169
Fabens.....	0	0	0	0	3	0	0	0	0	0	3	0
Galveston.....	55	1	43	96	5	0	10	12	0	0	113	109
Hawaii.....	66	0	1	0	39	0	1	0	93	0	200	0
Hidalgo.....	7	1	0	0	63	6	1	0	0	0	71	7
Houston.....	2	2	76	410	1	0	3	2	0	0	82	414
Jacksonville ²	4	0	35	282	0	0	11	3	11	12	61	297
Key West ²	0	0	0	0	14	2	7	0	0	0	21	2
Laredo.....	799	11	1	0	155	10	0	0	0	0	955	21
Los Angeles ²	7	0	0	0	0	0	0	0	21	1	28	1
Miami ²	10	3	45	15	165	17	101	2	0	0	321	37
Mobile ³	472	2	161	310	6	0	32	5	0	0	671	317
Naco.....	3	0	0	0	64	5	0	0	0	0	67	5
New Orleans.....	1,324	124	201	436	86	25	209	59	7	4	1,827	648
New York.....	867	208	351	237	315	77	50	2	17	10	1,600	534
Nogales.....	1,090	468	2	1	472	130	1	0	3	2	1,568	601
Norfolk.....	76	1	12	31	1	0	7	11	0	0	96	43
Pensacola ²	1	0	106	260	0	0	14	12	0	0	121	272
Philadelphia.....	2,289	337	613	1,122	44	34	142	110	228	110	3,316	1,713
Port Arthur ⁴	0	0	6	14	0	0	0	0	0	0	6	14
Portland.....	3	3	0	0	0	0	0	0	0	1	3	4
Presidio.....	17	0	1	0	7	0	0	0	0	0	25	0
Rio Grande City.....	4	2	0	0	1	2	0	0	0	0	5	4
Roma.....	0	0	0	0	7	0	0	0	0	0	7	0
San Diego ²	6	0	18	1	6	0	8	2	0	0	38	3
San Francisco ²	522	40	235	250	192	7	249	4	250	27	1,448	328
San Juan.....	22	9	6	0	7	0	0	0	1	0	36	9
San Pedro ²	314	2	111	10	79	1	13	0	0	0	517	13
San Ysidro.....	3	2	0	0	24	0	0	0	0	0	27	2
Sasabe.....	0	0	0	0	2	1	0	0	0	0	2	1
Savannah.....	5	1	25	106	0	0	13	5	0	0	43	112
Seattle.....	127	33	79	45	35	22	78	44	12	35	331	179
St. Paul ²	0	0	0	0	0	0	0	0	8	3	8	3
Tampa ²	3	2	27	89	7	0	14	0	0	0	51	91
Thayer.....	0	0	0	0	12	6	0	0	0	0	12	6
Washington, D. C.....	348	144	0	0	6	3	0	0	721	347	1,075	494
Ysleta.....	0	0	0	0	1	3	0	0	0	0	1	3
Zapata ⁵	0	0	0	0	2	0	0	0	0	0	2	0
Miscellaneous.....	3	2	0	0	0	0	0	0	0	0	3	2
Total.....	9,756	1,899	2,729	4,371	2,446	564	1,076	303	1,512	649	17,519	7,786

¹ Includes interceptions at Providence, R. I.

² Collaborators stationed at these ports.

³ Includes interceptions at Gulfport, Miss.

⁴ Includes interceptions at Beaumont and Sabine, Tex., and Lake Charles, La.

⁵ Closed Dec. 18, 1933.

NOTE.—Inspectors stationed at Puerto Rico made 12 interceptions of insects and 6 interceptions of plant diseases during their field and packing-house inspection of fruits and vegetables for shipment to the mainland.

CERTIFICATION FOR EXPORT

The demand for certification for export has continued to increase from year to year. During the fiscal year 1934, 7,222 shipments including 2,720,474 containers, were inspected and certified. Certificates were issued at 23 ports and covered 37 different commodities which were exported to 53 foreign countries.

Some of the more important commodities inspected and certified were: Apples, 3,212 shipments, consisting of 1,453,108 boxes, 76,957 barrels, and 125,028 baskets; pears, 1,255 shipments, consisting of 600,572 boxes, 145 barrels, and 2,608 baskets; potatoes, 707 shipments, consisting of 115,795 bags, 8,857 barrels, and 1,221 crates and boxes.

TECHNOLOGICAL DIVISION

Cooperative work on problems of sterilization and treatment of plants and plant products, much of it being a continuation of work already under way in the previous fiscal year, was carried on with other divisions and projects of the Bureau. Considerable construction work was taken up under the Public Works Administration appropriations and supervised by members of this organization.

A cottonseed sterilizer, designed in the spring of 1933, for treatment of cottonseed for pink bollworm larvae, was put into operation on a commercial basis at three gins in Florida during the season of 1933. In this machine, the seed is heated by conditioned air, the heat being furnished by steam or by means of a vaporizing burner. In the three machines installed in Florida, steam was used as a source of heat in all cases. The machine has a capacity of about 1½ tons of seed per hour, and during the season approximately 1,000 tons of cottonseed were sterilized by this method with these machines. A patent has been applied for on both the process and apparatus.

The fumigation of baled cotton at atmospheric pressures was studied, and it was found that by spacing the bales from 4 to 6 inches apart it was possible to kill any pink bollworm present in seeds in the cotton bale to a depth of 3 inches, even when the temperatures were as low as 50° F., with a dosage of 3 ounces of hydrocyanic acid per 100 cubic feet of chamber space, including the space occupied by the bales. This treatment is therefore effective for cotton which is compressed, as the survival of pink bollworm in compressed bales is practically all in the outer 3 inches of the bale.

Analyses of soil for lead arsenate in plots of growing plants in the Japanese beetle infested area were made during April and May. In this work, soil from 701 plots of growing plants, plunging frames, or heeling-in areas in 18 nurseries located in Pennsylvania and New Jersey was analyzed. In all, 851 samples were taken and 1,702 analyses made. Of these plots, 251 required additional lead arsenate to bring the concentration up to 1,500 pounds in the first 3 acre-inches, while in the remaining 450 plots no lead arsenate was required to maintain the plots in a certified status. The total area of the plots of which the analyses were made was 4,948,884 square feet, of which 1,726,608 square feet required additional lead arsenate to bring it up to the required concentration in the first 3 acre-inches. In all, 12,864 pounds of lead arsenate would be required.

A series of experiments was carried out in which the lead arsenate content of the upper 3 inches of soil in 16 nursery plots of various soil types was determined on six occasions at intervals of about a month. From these data no consistent rate of decrease in the lead arsenate content in the upper 3 inches of soil was evident. The proper time for sampling soil for these control analyses is thus apparently just before it is necessary to apply the treatment.

In a comparison of the adhesiveness of (a) lead arsenate with fish oil added, and (b) lead oleate-coated lead arsenate, as sprays for Japanese beetle, it was found that a much larger quantity of the insecticide was present on the leaves immediately after they had been sprayed with the fish-oil mixture and that it adhered better, as shown by analysis after 2 or 3 weeks.

A new house for the fumigation of freight cars was constructed at Brownsville, Tex., to replace the one destroyed in September 1933. Plans and specifications for the construction of this house and for 13 other projects on the Mexican border on funds provided by the Public Works Administration were prepared and the work supervised. These projects included new steel gastight doors at Laredo and El Paso, Tex., and reroofing the houses at Eagle Pass and El Paso. The installation of equipment for use of volatilized gas in fumigation at Eagle Pass and El Paso, fencing all fumigation houses, and building a retaining wall for diversion of flood waters at Nogales, Ariz., were also accomplished. Part of the work was done by contract and part by force account. All projects except

one were completed by July 1, 1934, and that was 55 percent completed on that date.

An increase in the gypsy moth control work during the present season made necessary an extensive spraying campaign in which this organization assisted in the remodeling, construction, and repairing of mechanical equipment used in this work. Approximately \$90,000 was expended on remodeling the large fleet of sprayer trucks already on hand and, in addition, 10 new units were purchased. Quantities of spray-hose couplings and spray materials were purchased, and a number of improvements in the mechanical equipment developed, which made the work more economical and efficient. More than 100 small automobile trucks were reconditioned and prepared for service at a cost of \$10,000. The entire program was begun in September 1933 and completed in April 1934, in ample time for the equipment to be available for the intensive control program of the gypsy moth project.

Considerable service work was performed for the other divisions of the Bureau during the past year, and a number of minor problems were given attention.

TERMINAL INSPECTION OF MAIL SHIPMENTS OF PLANTS AND PLANT PRODUCTS

The State of Arkansas discontinued terminal inspection during the fiscal year. No change was made in the inspection points or in the lists of plants and plant products subject to terminal inspection in any of the other States.

Terminal inspection is now maintained by the following: California, Arizona, Montana, Florida, Washington, the District of Columbia, Mississippi, the Territory of Hawaii, Utah, Oregon, Oklahoma, Louisiana, and the Territory of Puerto Rico.

CONVICTIONS AND PENALTIES IMPOSED FOR VIOLATIONS OF THE PLANT QUARANTINE ACT

The following convictions and penalties imposed for violations of the Plant Quarantine Act were reported to the Bureau during the year:

European corn borer quarantine (domestic): One conviction, with fine of \$100.

Japanese beetle quarantine: Two convictions, with fines aggregating \$60.

Mediterranean fruit fly and melon fly quarantine: One conviction, with fine of \$10.

Nursery stock, plant, and seed quarantine: A fine of \$22.50 was imposed by the customs official at New Orleans against a person caught attempting to smuggle in 12 orchid plants from Brazil.

Quarantines affecting Mexican plant products: Fines aggregating \$316.50 were imposed by customs officials on the Mexican border against 120 persons caught attempting to smuggle in from Mexico prohibited plants and plant products.

Quarantines affecting Canadian plant products: Fines aggregating \$10 were imposed by customs officials on the Canadian border against two persons caught attempting to smuggle in from Canada prohibited plants and plant products.



REPORT OF THE CHIEF OF THE BUREAU OF PUBLIC ROADS, 1934

UNITED STATES DEPARTMENT OF AGRICULTURE,
BUREAU OF PUBLIC ROADS,
Washington, D.C., September 1, 1934.

SIR: I submit herewith the report of the Bureau of Public Roads for the fiscal year ended June 30, 1934.

Respectfully,

THOMAS H. MACDONALD,
Chief.

HON. HENRY A. WALLACE,
Secretary of Agriculture.

The work of road construction supervised by the Bureau of Public Roads during the fiscal year 1934 far exceeded in volume the work of any previous year. Augmenting balances of earlier appropriations available at the beginning of the year, the grants made under authority of the National Industrial Recovery Act contributed largely to a total fund for road construction under Federal auspices greater than any amount previously available at one time.

The work done has been subject to the provisions of various laws. In part it has consisted of Federal-aid road construction financed with joint Federal and State funds. In part it has been supplied with funds appropriated by the Emergency Relief and Construction Act of July 21, 1932; in part by funds made available by the National Industrial Recovery Act. The roads built have been sections of the Federal-aid highway system, extensions of the system into and through cities, important secondary or feeder roads, and sections of main highways through the national forests, parks, and public lands. The various appropriating acts have required the employment of different procedures; but regardless of class or location the common effect of all work done and, under existing conditions the most important, has been to increase employment.

EMPLOYMENT ON ROAD WORK

Congressional effort to increase employment through road work began with the act approved April 4, 1930, which, for the fiscal year 1931, increased the provision for Federal-aid road construction from \$75,000,000, previously authorized, to \$125,000,000, and authorized like appropriations for the fiscal years 1932 and 1933. This was followed by the act of December 20, 1930, which appropriated \$80,000,000 to be advanced to the States for expenditure prior to September 1, 1931, and repayment by deduction from future apportionments of Federal aid, and this in turn by the Emergency Relief and Construction Act of July 21, 1932, which appropriated \$120,000,000, also to be advanced and expended in a limited period with stipulation of repayment by deduction from future Federal-aid authorizations.

The two emergency appropriations were intended to meet what it was believed at the time would be a quickly passing difficulty of the States in matching Federal authorizations; hence the limited term of expenditure and the requirement of repayment by deduction from future Federal-aid apportionments.

A clearer recognition of the magnitude of the depression is indicated by the outright grant of enlarged amounts provided by the National Industrial Recovery Act, which next provided for road work; and a similar view is evident in the terms of the most recent act, approved June 18, 1934, which not only provides further outright grants, but also cancels the obligations created by the two emergency appropriations, and provides that no further deductions shall be made from future Federal-aid authorizations on account of the advances received by the States. This action was not taken, however, until one installment of the

repayment required by the act of December 20, 1930, had been deducted from the Federal-aid apportionment for the fiscal year 1933.

Effects of all of these acts were present in the work of the past year; that of the act of December 20, 1930, slightly decreasing the funds available, and those of the other acts largely increasing the road-construction provision above the predepression level.

The result in terms of employment is shown by table 1. It will be noted that the employment on Federal and Federal-aid road construction supervised by the Bureau has increased materially each year since the fiscal year 1932, reaching in the last year a total of 2,120,761 man-months, an amount nearly equal to the combined total for the 2 preceding years.

TABLE 1.—*Comparison of employment during fiscal years 1932, 1933, and 1934 on all Federal and Federal-aid highway construction and on all Federal and State road work, including State maintenance operations, by months*

Month	Men employed on all Federal and Federal-aid highway construction			Total men employed on all Federal and State highway construction and maintenance		
	1932	1933	1934	1932	1933	1934
July.....	164,708	81,042	129,205	385,349	305,372	332,277
August.....	151,418	89,346	111,211	389,949	333,403	329,813
September.....	116,100	122,193	115,047	356,617	374,405	337,973
October.....	88,869	124,106	154,016	330,104	373,246	384,029
November.....	62,466	129,933	185,860	289,316	371,667	420,069
December.....	35,991	98,271	174,358	244,971	290,465	362,031
January.....	29,518	75,498	154,154	229,189	266,443	315,989
February.....	26,673	78,215	156,814	218,218	255,256	306,090
March.....	28,008	95,704	144,053	211,549	279,213	296,265
April.....	42,205	122,256	187,657	245,843	299,882	345,278
May.....	59,008	139,831	271,972	259,615	330,138	466,504
June.....	71,772	152,276	336,414	280,636	359,605	545,013
Total (man-months).....	876,736	1,308,671	2,120,761	3,441,356	3,839,095	4,441,331

The 1934 monthly employment, never lower than 111,211, the level of August 1933, before the stimulation of the National Industrial Recovery Act had been felt, reached in June 1934 a maximum of 336,414, when the new public works program was at its height. The average employment was 176,730 men throughout the year.

It is desired to stress the fact that these figures represent direct employment on the roads only and do not include the indirect employment provided in the production and transportation of materials and equipment used in the construction work. This indirect employment is conservatively estimated at 1.4 times the direct, or, for the year 1934, approximately 3,000,000 man-months.

It should also be explained that the figures reported represent continuous employment and not numbers of individual workers employed. A study of the pay rolls for the year indicates that the number of individuals given work in any month averages about four-tenths greater than the man-months of continuous employment. This is the result of the limit placed upon individual working hours. The 176,730 continuous employment average, therefore, represents an average of nearly 250,000 individuals directly employed throughout the year.

Referring again to table 1, it will be seen that the Federal and Federal-aid road construction employment supervised by the Bureau, has constituted an increasing proportion of the total employment afforded by all Federal and State highway construction and maintenance work since 1932. In that year the Federal work was approximately a fourth of the total program; in 1933 the proportion increased to about one-third; and in the fiscal year 1934 the work supervised by the Bureau employed nearly half of the total number of workers on all State and Federal projects including those employed on maintenance work by the States.

Table 2 gives details of the 1934 Federal and State employment by months, segregating the numbers of workers employed on the various classes of Federal and Federal-aid work supervised by the Bureau, and giving separately the numbers employed on independent State construction and maintenance. This table shows how the employment on Federal-aid projects and other work financed by the earlier appropriations—large at the beginning of the fiscal year—decreased from month to month, and how the work provided for by the several appropriations of the National Industrial Recovery Act developed monthly to maximum proportions at the end of the year.

TABLE 2.—Employment during the fiscal year 1934 on the several classes of Federal and Federal-aid road construction and State road construction and maintenance

[illegible]

In consonance with the paramount employment motive of the Recovery Act the rules and regulations imposed a number of conditions upon the expenditure of the public works appropriations which had the effect of increasing the amount of human employment per unit of expenditure, of increasing the numbers of individuals employed, and of distributing the benefits of the expenditure widely and in approximate relation to the employment need.

Wherever practicable and consistent with sound economy and public advantage it was required that work be done by human labor instead of machinery. This was accomplished by means of special provisions requiring hand labor, which were attached to the specifications governing the work. But, in thus requiring the substitution of human labor for mechanical means on certain classes of work, there was studied effort to avoid so great an abandonment of machine methods as would seriously jeopardize the highly efficient and important road-machinery industry.

By the approval of varied types of improvement a desirable balance was maintained between the volume of direct labor afforded at the site of the work and the volume of indirect employment afforded at the material and equipment plants and in the transport industries. On work of the lower types, which was encouraged on the secondary and feeder roads where traffic density would permit, the direct local employment formed a large part of the total. In the higher types of improvement, approved for main rural roads and streets in cities, the element of indirect employment is greater.

By requiring a reasonable minimum of expenditure on extensions of the Federal-aid highway system across cities, opportunities for work were held out to the city unemployed. By imposing a similar requirement necessitating use of a portion of the funds for construction of secondary or feeder roads a volume of work particularly fitted for large local employment was insured.

The limits imposed on the hours of work to be allowed to individuals had the effect of increasing the number of individuals employed, and effort was made to compensate the individual for reduction of his hours of work by increasing his hourly wage. This was done by requiring the establishment by the several State highway departments of minimum rates of wage sufficient to provide, for the hours of labor as limited and in consideration of other existing conditions, a standard of living in decency and comfort.

In the employment of labor the services of local agencies of the Federal Employment Service were invariably utilized, and the several preferences required by the act were closely observed.

The rules and regulations, issued with the approval of the Special Board for Public Works, required that road-building projects should be provided in not less than 75 percent of the counties of each State. As shown by table 3, this desirable degree of diffusion of the employment opportunity was realized and exceeded in the work undertaken up to the end of the fiscal year. In 2,649 counties, or 86 percent of the total number in the United States, some employment was provided by the highway construction funds appropriated by the National Industrial Recovery Act.

TABLE 3.—*Number of counties in which Public Works highway projects have been undertaken to June 30, 1934, by States*

State	Total counties	Counties in which projects have been undertaken		State	Total counties	Counties in which projects have been undertaken	
		Number	Percent			Number	Percent
Alabama.....	67	63	94	New Hampshire.....	10	10	100
Arizona.....	14	13	93	New Jersey.....	21	20	95
Arkansas.....	75	63	84	New Mexico.....	31	30	97
California.....	58	49	84	New York.....	62	54	87
Colorado.....	63	57	90	North Carolina.....	100	86	86
Connecticut.....	8	6	75	North Dakota.....	53	53	100
Delaware.....	3	3	100	Ohio.....	88	87	99
Florida.....	67	55	82	Oklahoma.....	77	76	99
Georgia.....	159	99	62	Oregon.....	36	34	94
Idaho.....	44	32	73	Pennsylvania.....	67	67	100
Illinois.....	102	93	91	Rhode Island.....	5	5	100
Indiana.....	92	63	68	South Carolina.....	46	46	100
Iowa.....	99	91	92	South Dakota.....	69	61	88
Kansas.....	105	98	93	Tennessee.....	95	68	72
Kentucky.....	120	100	83	Texas.....	254	229	90
Louisiana.....	64	49	77	Utah.....	29	28	97
Maine.....	16	16	100	Vermont.....	14	13	93
Maryland.....	23	23	100	Virginia.....	100	79	79
Massachusetts.....	14	11	79	Washington.....	39	31	79
Michigan.....	83	83	100	West Virginia.....	55	45	82
Minnesota.....	87	78	90	Wisconsin.....	71	70	99
Mississippi.....	82	61	74	Wyoming.....	23	23	100
Missouri.....	114	87	76	Hawaii.....	4	4	100
Montana.....	56	52	93				
Nebraska.....	93	70	75	Total.....	3, 074	2, 649	86
Nevada.....	17	15	88				

CLASSES OF WORK SUPERVISED BY THE BUREAU

The road-construction work supervised by the Bureau during the fiscal year was of several classes, supported by funds appropriated by a number of different acts.

A diminishing portion of the program was provided for by the unexpended balances of Federal-aid appropriations authorized over a period of years ended with the fiscal year 1933.

A portion that rapidly increased as the year grew older was financed with funds appropriated by the National Industrial Recovery Act for improvements on the Federal-aid highway system and its municipal extensions and on secondary or feeder roads.

These were the larger classes of work. Smaller in total volume, more restricted in location, but nevertheless locally important were three other classes, embracing the improvement of national-forest highways, national-park highways, and highways through the public lands of the United States. Of these the first and third were under the sole administration of the Department. The national-park highways were constructed with appropriations made to the Interior Department, but under an interdepartmental agreement were supervised by the Bureau. All three classes were supported at the beginning of the year mainly by earlier appropriations, with increasing support from appropriations made by the National Industrial Recovery Act as the year progressed.

Two other classes of work developed during the year—both as outgrowths of the recovery legislation. First was the work-relief construction which was begun in the fall of 1933 as a means of providing quick and specialized relief in a number of States in which unemployment conditions were particularly acute. On this work the Bureau with the cooperation of the State highway departments acted only to supervise the construction. The workers were selected and paid by the Federal Emergency Relief Administration, and funds necessary to meet expenses of material and equipment were provided by special grants made by the Public Works Administration.

The other new class consisted of projects financed under the loan-and-grant provisions of the National Industrial Recovery Act, which after approval by the Public Works Administration were, late in the year, placed by that body under the supervision of the Bureau.

In addition to the several classes mentioned above, the year's work included only an inconsiderable volume of improvement under several appropriations for the reconstruction of roads damaged by floods in several States.

The year's activities in respect to each of these classes of work are reported separately hereafter.

STATUS OF MAJOR APPROPRIATIONS

The greater part of the Bureau's work during the year was supported by appropriations of three general types, as follows:

(1) Federal-aid appropriations made under authorizations for fiscal years up to 1933. These appropriations must be matched with State or other funds, and when so matched are available for expenditure only on the approved Federal-aid highway system.

(2) The appropriation made by the Emergency Relief and Construction Act of 1932. This appropriation was available to the States to be used, in lieu of State funds, for the purpose of matching Federal-aid appropriations. It could also be used in conjunction with funds appropriated by the National Industrial Recovery Act. The availability of this money originally terminated on July 1, 1933, but was extended by later legislation to September 1, 1934.

(3) The appropriation made by section 204 of the National Industrial Recovery Act for improvement of the Federal-aid system and its municipal extensions and secondary or feeder roads. This money is available for payment of the whole cost of improvements except expenses for right-of-way, but may be used in conjunction with either Federal-aid or emergency-construction funds or both.

FEDERAL-AID FUNDS

No funds of this character were authorized for the fiscal year 1934. In 3 years from 1931 to 1933, inclusive, they were authorized at the rate of \$125,000,000 a year but the last authorization was subject to reduction in the amount of one-fifth of the amount actually expended of the emergency funds provided by the act of December 20, 1930. The amount so deducted was \$15,840,743.86.

Table 4 gives for the fiscal years 1923 to 1933, inclusive, the amounts of the Federal-aid funds apportioned among the States after deducting the percentage allowable for Federal administration, and, for the same period of years with addition of 1934, the amounts obligated to definite projects and amounts paid for work done during each of the years. It will be observed that the maximum rate of obligation and expenditure of these funds was reached in the fiscal year 1931, with recession in later years as the unobligated and unexpended balances were reduced and other funds became available. As shown by this table the amount of Federal-aid funds paid to the States in the fiscal year 1934 was \$42,291,937.

TABLE 4.—*Federal-aid funds apportioned to the States, obligated to projects and paid to the States each fiscal year, 1923 to 1934, inclusive*

Fiscal year	Apportioned amount of appropriation authorized for the year	Amount of Federal-aid funds obligated during the year	Amount of Federal-aid funds paid to States during the year
1923.....	\$48,750,000.00	\$77,461,559	\$69,677,241.86
1924.....	63,375,000.00	89,866,864	79,217,397.90
1925.....	73,125,000.00	87,294,396	95,749,998.11
1926.....	73,125,000.00	79,608,897	87,754,534.57
1927.....	73,125,000.00	77,453,046	81,371,013.03
1928.....	73,125,000.00	88,922,185	80,802,232.55
1929.....	73,125,000.00	70,428,896	82,097,380.38
1930.....	73,125,000.00	102,498,084	75,880,862.84
1931.....	121,875,000.00	157,952,903	133,340,910.64
1932.....	121,875,000.00	83,793,787	127,367,119.74
1933.....	106,034,256.14	46,689,026	101,266,331.02
1934.....		12,847,071	42,291,936.73
Total.....	900,659,256.14	974,816,714	1,056,816,959.37
Average.....	¹ 81,878,114.19	81,234,726	88,068,079.95

¹ Average for 11 years. No Federal-aid funds were authorized for fiscal year 1934.

Details of this expenditure are given by States in table 5, which also shows the status of the unexpended funds at the close of the fiscal year. It will be noted that only \$2,343,260 of the authorized funds were at that time unobligated. Unpaid there was a balance of \$16,815,933; but of this sum a portion was already earned by the completion of work for which it was allotted, and the unearned balance was only approximately \$10,211,000 at the end of the year.

TABLE 5.—*Federal aid paid to States during the fiscal year 1934, and unpaid, unearned, and unobligated balances of the total Federal-aid apportionment on June 30, 1934*

State	Paid to States	Unpaid balance	Unearned balance	Unobligated balance
Alabama.....	\$2, 324, 634. 14	\$2, 043, 129. 04	\$1, 592, 000	\$351, 115. 15
Arizona.....	560, 394. 49	59, 784. 04	38, 000	33, 103. 61
Arkansas.....	1, 494, 124. 06	648, 415. 99	545, 000	75, 129. 29
California.....	655, 553. 02	36, 786. 21	3, 000	1, 821. 49
Colorado.....	925, 237. 45	211, 472. 94	42, 000	27, 377. 17
Connecticut.....	515, 624. 60	474, 321. 96	254, 000	9, 178. 67
Delaware.....	201, 522. 96	5, 270. 48	5, 000	2, 312. 20
Florida.....	1, 695, 063. 72	394, 337. 30	197, 000	7, 447. 41
Georgia.....	391, 954. 97	184, 458. 57	153, 000	152, 218. 29
Idaho.....	337, 566. 03	102, 711. 87	70, 000	59, 268. 92
Illinois.....	1, 774, 923. 47	865, 402. 93	462, 000	54, 521. 60
Indiana.....	819, 805. 79	288, 186. 55	110, 000	-----
Iowa.....	264, 678. 43	-----	-----	-----
Kansas.....	703, 004. 64	113, 490. 85	114, 000	113, 490. 85
Kentucky.....	889, 745. 76	42, 503. 66	19, 000	13, 361. 92
Louisiana.....	1, 086, 896. 48	251, 354. 15	168, 000	-----
Maine.....	267, 431. 91	172. 41	-----	172. 41
Maryland.....	108, 541. 13	6, 123. 96	-----	-----
Massachusetts.....	872, 096. 37	369, 103. 41	132, 000	9, 264. 56
Michigan.....	1, 267, 149. 36	168, 815. 75	28, 000	7, 434. 87
Minnesota.....	200, 482. 17	177, 918. 47	40, 000	-----
Mississippi.....	2, 505, 921. 08	2, 087, 731. 39	1, 600, 000	259, 765. 82
Missouri.....	537, 918. 16	131, 801. 96	124, 000	105, 362. 40
Montana.....	1, 425, 177. 35	463, 904. 52	315, 000	-----
Nebraska.....	607, 433. 39	151, 237. 92	140, 000	5, 804. 68
Nevada.....	387, 267. 79	43, 327. 07	43, 000	-----
New Hampshire.....	224, 716. 03	46, 441. 90	28, 000	20, 454. 57
New Jersey.....	1, 182, 237. 99	813, 121. 49	167, 000	32, 005. 49
New Mexico.....	475, 389. 13	167, 928. 32	80, 000	-----
New York.....	3, 021, 672. 54	1, 197, 343. 64	468, 000	36, 138. 40
North Carolina.....	1, 448, 914. 13	816, 152. 24	714, 000	140, 296. 10
North Dakota.....	1, 032, 699. 12	747, 829. 63	467, 000	65, 982. 52
Ohio.....	931, 300. 25	252, 357. 07	150, 000	133, 911. 36
Oklahoma.....	909, 018. 25	197, 510. 08	133, 000	129, 886. 18
Oregon.....	712, 204. 38	284, 343. 34	248, 000	6, 519. 97
Pennsylvania.....	1, 426, 678. 37	159, 148. 20	29, 000	29, 027. 84
Rhode Island.....	191, 834. 72	62, 867. 28	25, 000	62, 867. 28
South Carolina.....	275, 562. 48	105, 320. 77	34, 000	27, 749. 78
South Dakota.....	360, 972. 48	555, 054. 74	365, 000	34, 633. 42
Tennessee.....	1, 263, 315. 71	217, 824. 10	104, 000	14, 771. 08
Texas.....	2, 752, 059. 57	296, 156. 07	124, 000	73, 364. 70
Utah.....	318, 341. 01	249, 712. 46	100, 000	100, 228. 86
Vermont.....	59, 010. 26	6, 553. 48	6, 000	-----
Virginia.....	605, 451. 05	608, 934. 50	226, 000	111, 246. 83
Washington.....	424, 495. 23	16, 168. 04	1, 000	-----
West Virginia.....	374, 055. 40	75, 175. 40	36, 000	32, 197. 59
Wisconsin.....	515, 271. 05	66, 490. 14	40, 000	-----
Wyoming.....	277, 718. 07	143, 272. 61	75, 000	-----
Hawaii.....	688, 870. 79	408, 484. 58	397, 000	3, 827. 16
Total.....	42, 291, 936. 73	16, 815, 933. 48	10, 211, 000	2, 343, 260. 44

By act approved June 18, 1934, additional Federal-aid appropriations were authorized to be made in the amount of \$125,000,000 for each of the fiscal years 1936 and 1937. In accordance with the requirements of the Federal Highway Act, as amended, the first of these sums will be apportioned on or before January 1, 1935.

EMERGENCY CONSTRUCTION FUNDS

The amount appropriated by the Emergency Relief and Construction Act of 1932 was \$120,000,000. The entire sum, without deduction for Federal administrative purposes, was apportioned among the several States and Hawaii as shown by table 6. These sums have since been expended in conjunction with

Federal-aid apportionments and apportionments under the Recovery Act, the total expenditure to June 30, 1934, being \$117,801,106, as also detailed in table 6. Of the total payments to that date the table shows that \$53,669,145 was expended during the fiscal year 1934. The unexpended balance on June 30 was \$2,198,893, which under the law is available for expenditure until September 1, 1934.

TABLE 6.—*Emergency construction apportionment, and amounts paid to States for the fiscal year 1934, and the total paid to June 30, 1934*

State	Emergency construction apportionment	Paid to States during fiscal year	Total paid to States
Alabama.....	\$2,558,229	\$995,831.15	\$2,459,481.88
Arizona.....	1,760,771	532,825.26	1,760,771.00
Arkansas.....	2,101,182	1,103,914.48	1,902,477.37
California.....	4,667,188	1,270,621.86	4,667,188.00
Colorado.....	2,258,613	1,074,298.69	2,252,465.93
Connecticut.....	778,806	579,504.01	778,806.00
Delaware.....	600,000	600,000.00	600,000.00
Florida.....	1,624,752	606,598.97	1,606,492.36
Georgia.....	3,123,298	739,944.03	3,123,298.00
Idaho.....	1,505,912	703,613.01	1,463,572.47
Illinois.....	5,082,847	3,668,754.15	5,047,271.14
Indiana.....	3,058,980	3,058,980.00	3,058,980.00
Iowa.....	3,171,504	767,516.02	3,171,504.00
Kansas.....	3,265,048	1,200,149.43	3,265,048.00
Kentucky.....	2,284,637	1,299,458.60	2,284,637.00
Louisiana.....	1,745,559	587,089.44	1,745,559.00
Maine.....	1,067,079	677,062.94	1,067,079.00
Maryland.....	1,019,570	584,762.73	1,012,258.46
Massachusetts.....	1,716,612	949,563.31	1,716,612.00
Michigan.....	3,779,706	1,943,559.90	3,741,758.47
Minnesota.....	3,368,559	1,632,238.28	3,368,559.00
Mississippi.....	2,160,164	1,451,997.95	2,110,277.21
Missouri.....	3,753,453	2,182,531.78	3,753,453.00
Montana.....	2,525,071	887,899.75	2,525,070.99
Nebraska.....	2,544,773	468,687.55	2,544,773.00
Nevada.....	1,575,756	616,058.23	1,575,756.00
New Hampshire.....	600,000	359,347.65	585,770.91
New Jersey.....	1,657,733	266,812.33	1,126,499.65
New Mexico.....	1,965,473	296,123.13	1,965,473.00
New York.....	6,059,238	3,376,356.51	5,903,568.85
North Carolina.....	2,888,251	1,221,832.19	2,850,691.40
North Dakota.....	1,933,901	1,059,858.72	1,933,747.45
Ohio.....	4,490,175	2,281,141.54	4,360,381.66
Oklahoma.....	2,888,723	1,677,905.78	2,862,675.87
Oregon.....	2,001,740	947,972.47	1,894,260.81
Pennsylvania.....	5,267,060	3,017,822.63	5,267,060.00
Rhode Island.....	600,000	211,931.96	600,000.00
South Carolina.....	1,666,755	515,460.11	1,578,281.29
South Dakota.....	2,004,573	729,537.73	1,947,289.39
Tennessee.....	2,605,160	808,775.44	2,550,438.58
Texas.....	7,664,621	4,295,592.53	7,664,621.00
Utah.....	1,395,331	640,265.91	1,268,956.02
Vermont.....	600,000	341,655.44	600,000.00
Virginia.....	2,256,178	784,024.62	1,947,710.38
Washington.....	1,920,470	713,579.38	1,920,470.00
West Virginia.....	1,323,912	399,990.56	1,269,388.54
Wisconsin.....	2,991,076	983,531.22	2,986,704.18
Wyoming.....	1,541,561	456,621.02	1,541,561.00
Hawaii.....	600,000	99,544.95	592,407.32
Total.....	120,000,000	55,669,145.34	117,801,106.58

The act of December 20, 1930, which appropriated \$80,000,000 to be advanced for emergency construction provided for the repayment of amounts actually expended by deduction in five equal installments from future Federal-aid authorizations beginning with that for the fiscal year 1933. The first deduction was made, as previously reported, in the amount of \$15,840,743.86.

The Emergency Relief and Construction Act provided for repayment of its \$120,000,000 appropriation in similar manner over a period of 10 years, commencing with the fiscal year 1938.

Both of these repayment requirements were rescinded by the act approved June 18, 1934, in accordance with which no further deductions will be made on account of the advances made.

PUBLIC WORKS HIGHWAY FUNDS

By section 204 of the National Industrial Recovery Act the President was authorized to make grants to the highway departments of the several States in an amount not less than \$400,000,000, to be expended by such departments in general accord with the provisions of the Federal Highway Act with certain exceptions.

By direction of the President the amount of \$400,000,000 was allotted for the purpose named by the Public Works Administration for apportionment among the 48 States and the District of Columbia and Hawaii, as required by the act.

After deduction of 1½ percent for Federal administration the balance of \$394,000,000 was apportioned in the manner required by the act of June 16, 1933. Seven-eighths of the total was apportioned, as required in the manner prescribed for Federal-aid authorizations, i.e., three equal parts each were divided according to the area, population, and post-road mileage of the participating governmental units; and one-eighth was divided in proportion to population. The resulting apportionment is given in table 7.

TABLE 7.—*Apportionment and assignment of Public Works highway funds, June 30, 1934, as provided by sec. 204 of the National Industrial Recovery Act*

State	Apportionment	Assignment of apportioned funds—					
		To projects on the Federal-aid system outside of municipalities		To projects on extensions of the Federal-aid system into and through municipalities		To projects on secondary or feeder roads	
		Amount	Per cent	Amount	Per cent	Amount	Per cent
Alabama.....	\$8,370,133	\$4,185,067.00	50.0	\$2,092,533.00	25.0	\$2,092,533.00	25.0
Arizona.....	5,211,960	3,878,555.11	74.0	807,982.36	16.0	525,422.53	10.0
Arkansas.....	6,748,335	3,374,167.00	50.0	1,889,534.00	28.0	1,484,634.00	22.0
California.....	15,607,354	7,803,677.00	50.0	4,213,986.00	27.0	3,589,691.00	23.0
Colorado.....	6,874,330	3,437,265.00	50.0	1,718,633.00	25.0	1,718,632.00	25.0
Connecticut.....	2,865,740	1,404,213.00	49.0	802,407.00	28.0	659,120.00	23.0
Delaware.....	1,819,088	909,544.00	50.0	454,772.00	25.0	454,772.00	25.0
Florida.....	5,231,834	2,615,917.00	50.0	1,307,959.00	25.0	1,307,958.00	25.0
Georgia.....	10,091,185	5,045,592.00	50.0	2,724,620.00	27.0	2,320,973.00	23.0
Idaho.....	4,486,249	2,166,858.00	48.3	1,197,829.00	26.7	1,121,562.00	25.0
Illinois.....	17,570,770	4,585,971.00	26.1	7,718,839.00	43.9	5,265,960.00	30.0
Indiana.....	10,037,843	5,018,921.00	50.0	4,416,651.00	44.0	602,271.00	6.0
Iowa.....	10,055,660	5,027,830.00	50.0	2,815,585.00	28.0	2,212,245.00	22.0
Kansas.....	10,089,604	5,044,802.00	50.0	2,522,401.00	25.0	2,522,401.00	25.0
Kentucky.....	7,517,359	3,608,332.00	48.0	2,029,687.00	27.0	1,879,340.00	25.0
Louisiana.....	5,828,591	2,914,295.00	50.0	1,457,148.00	25.0	1,457,148.00	25.0
Maine.....	3,369,917	1,617,560.00	48.0	909,878.00	27.0	842,479.00	25.0
Maryland.....	3,564,527	1,782,263.00	50.0	891,132.00	25.0	891,132.00	25.0
Massachusetts.....	6,597,100	1,101,716.00	16.7	5,007,199.00	75.9	488,185.00	7.4
Michigan.....	12,736,227	6,113,389.00	48.0	3,438,781.00	27.0	3,184,057.00	25.0
Minnesota.....	10,656,569	4,561,011.00	42.8	3,719,143.00	34.9	2,376,415.00	22.3
Mississippi.....	6,978,675	3,489,337.00	50.0	1,744,669.00	25.0	1,744,669.00	25.0
Missouri.....	12,180,306	5,237,532.00	43.0	4,019,501.00	33.0	2,923,273.00	24.0
Montana.....	7,439,748	4,463,849.00	60.0	1,115,962.00	15.0	1,859,937.00	25.0
Nebraska.....	7,828,961	3,914,481.00	50.0	1,957,240.00	25.0	1,957,240.00	25.0
Nevada.....	4,545,917	2,909,387.00	64.0	500,051.00	11.0	1,136,479.00	25.0
New Hampshire.....	1,909,839	725,739.00	38.0	706,640.00	37.0	477,460.00	25.0
New Jersey.....	6,346,039	3,099,370.48	48.8	3,190,118.00	50.3	56,550.52	.9
New Mexico.....	5,792,935	2,896,467.00	50.0	1,448,234.00	25.0	1,448,234.00	25.0
New York.....	22,330,101	10,271,846.00	46.0	8,449,487.00	37.8	3,608,768.00	16.2
North Carolina.....	9,522,293	4,761,147.00	50.0	2,380,573.00	25.0	2,380,573.00	25.0
North Dakota.....	5,804,448	2,902,224.00	50.0	1,451,112.00	25.0	1,451,112.00	25.0
Ohio.....	15,484,592	7,277,758.00	47.0	4,335,686.00	28.0	3,871,148.00	25.0
Oklahoma.....	9,216,798	4,608,399.00	50.0	2,304,200.00	25.0	2,304,199.00	25.0
Oregon.....	6,106,896	3,053,448.00	50.0	1,526,724.00	25.0	1,526,724.00	25.0
Pennsylvania.....	18,891,004	6,691,194.00	35.4	4,854,988.00	25.7	7,344,822.00	38.9
Rhode Island.....	1,998,708	999,354.00	50.0	499,677.00	25.0	499,677.00	25.0
South Carolina.....	5,459,165	2,729,583.00	50.0	1,364,791.00	25.0	1,364,791.00	25.0
South Dakota.....	6,011,479	3,005,739.00	50.0	1,502,870.00	25.0	1,502,870.00	25.0
Tennessee.....	8,492,619	4,246,309.00	50.0	2,123,155.00	25.0	2,123,155.00	25.0
Texas.....	24,244,024	12,122,012.00	50.0	6,061,006.00	25.0	6,061,006.00	25.0
Utah.....	4,194,708	2,374,205.00	56.6	771,826.00	18.4	1,048,677.00	25.0
Vermont.....	1,867,573	928,184.00	49.7	500,509.00	26.8	438,880.00	23.5
Virginia.....	7,416,757	3,708,379.00	50.0	2,008,458.00	27.1	1,699,920.00	22.9
Washington.....	6,115,867	3,057,934.00	50.0	1,977,260.00	32.3	1,080,673.00	17.7
West Virginia.....	4,474,234	2,013,405.00	45.0	1,342,270.00	30.0	1,118,559.00	25.0
Wisconsin.....	9,724,881	4,615,429.00	47.5	2,684,067.00	27.6	2,425,385.00	24.9
Wyoming.....	4,501,327	2,250,663.00	50.0	1,125,332.00	25.0	1,125,332.00	25.0
District of Columbia.....	1,918,469	-----	-----	959,235.00	50.0	959,234.00	50.0
Hawaii.....	1,871,062	1,683,956.00	90.0	-----	-----	187,106.00	10.0
Total.....	394,000,000	186,234,275.59	47.3	115,042,340.36	29.2	92,723,384.05	23.5

The rules and regulations, issued by the Secretary of Agriculture with approval of the Special Board for Public Works on June 23, 1933, required that not more than 50 percent of the funds apportioned to any State should be applied to projects on the Federal-aid system outside of the corporate limits of municipalities, and not less than 25 percent to projects on extensions of the Federal-aid system into and through municipalities, the balance (not more than 25 percent) to be applied to secondary or feeder roads, all subject to certain exceptions as might be required by existing conditions.

Each State highway department was required at the outset to submit a preliminary statement of the proposed assignment to the three classes of projects, conforming to the above requirements, and, as promptly as possible thereafter, to submit for approval a program in detail of the locations of projects to be developed with the amounts tentatively to be allotted to each. The assignments as approved are also shown in table 7.

The assignments approved, programs were submitted and approved without undue delay, and the definite obligation of the money to planned projects proceeded rapidly. On June 30, 1934, there remained only \$26,606,762 unobligated as shown by table 8, and the amounts obligated were divided among the three classes of projects in the several States as shown.

TABLE 8.—*Status of obligation of apportioned Public Works highway funds, June 30, 1934*

State	Total apportionment	Obligated to projects—			Balance unobligated
		On the Federal-aid system outside of municipalities	On extensions of the Federal-aid system into and through municipalities	On secondary or feeder roads	
Alabama.....	\$8,370,133	\$3,703,255.35	\$2,021,073.79	\$1,844,514.68	\$801,289.18
Arizona.....	5,211,960	3,849,592.80	762,925.76	520,199.36	79,242.08
Arkansas.....	6,748,335	3,165,249.95	1,785,803.10	1,125,572.99	671,708.96
California.....	15,607,354	7,794,571.70	4,170,374.60	3,370,187.46	272,220.24
Colorado.....	6,874,530	3,427,087.02	1,647,302.57	1,690,915.51	109,224.90
Connecticut.....	2,865,740	1,399,781.88	801,335.26	659,120.00	5,602.86
Delaware.....	1,819,088	895,682.01	418,154.71	254,337.50	250,913.78
Florida.....	5,231,834	2,474,109.07	1,307,959.00	1,276,269.83	173,496.10
Georgia.....	10,091,185	4,150,027.70	1,569,042.30	1,267,603.09	3,104,511.91
Idaho.....	4,486,249	2,062,955.10	1,131,268.94	1,121,562.00	170,462.96
Illinois.....	17,570,770	4,526,063.09	7,545,903.54	5,265,960.00	232,843.37
Indiana.....	10,037,843	5,018,921.00	4,018,041.37	540,734.86	460,145.77
Iowa.....	10,055,660	5,008,455.50	2,169,419.50	2,212,245.00	665,540.00
Kansas.....	10,089,604	5,044,802.00	2,522,401.00	2,522,401.00	-----
Kentucky.....	7,517,359	3,608,332.00	1,313,825.58	1,869,467.43	725,733.99
Louisiana.....	5,828,591	2,671,632.13	1,457,148.00	1,282,354.88	417,455.99
Maine.....	3,369,917	1,503,746.86	830,956.22	832,924.50	202,289.42
Maryland.....	3,564,527	1,253,345.03	386,588.31	848,166.20	1,076,427.46
Massachusetts.....	6,597,100	1,020,088.06	4,760,414.75	469,741.41	346,855.78
Michigan.....	12,736,227	5,810,696.00	3,330,370.00	3,069,700.00	525,461.00
Minnesota.....	10,656,569	4,561,011.00	3,116,986.64	2,180,092.88	798,478.48
Mississippi.....	6,978,675	2,921,629.97	1,051,512.55	1,247,149.80	1,758,382.68
Missouri.....	12,180,306	4,997,772.36	3,405,062.84	2,861,843.14	915,627.66
Montana.....	7,439,748	4,460,575.17	1,108,927.26	1,859,101.96	11,143.61
Nebraska.....	7,828,961	3,913,681.39	1,937,151.64	1,954,539.51	23,588.46
Nevada.....	4,545,917	2,829,544.63	458,967.14	1,008,029.88	249,375.35
New Hampshire.....	1,909,839	646,720.06	706,640.00	477,383.82	79,095.12
New Jersey.....	6,346,039	2,730,945.88	2,928,244.38	56,550.52	630,298.22
New Mexico.....	5,792,935	2,835,862.97	1,348,276.16	1,246,115.17	362,680.70
New York.....	22,330,101	10,217,884.12	7,781,926.87	3,598,271.33	732,018.68
North Carolina.....	9,522,293	4,165,843.62	1,833,496.43	1,851,173.75	1,671,779.20
North Dakota.....	5,804,448	2,835,758.70	1,151,825.47	727,957.69	1,088,906.14
Ohio.....	15,484,592	7,241,144.63	4,329,185.88	3,820,428.00	93,833.49
Oklahoma.....	9,216,798	4,315,911.77	2,081,894.67	2,276,385.92	542,605.64
Oregon.....	6,106,896	3,044,966.08	1,415,326.54	1,526,724.00	119,879.38
Pennsylvania.....	18,891,004	6,627,677.96	4,265,313.83	7,247,292.79	750,719.42
Rhode Island.....	1,998,708	996,029.70	499,677.00	412,465.02	90,536.28
South Carolina.....	5,459,165	2,444,212.87	1,124,097.85	1,364,791.00	526,063.28
South Dakota.....	6,011,479	2,752,531.80	1,143,740.66	1,021,899.41	1,093,307.13
Tennessee.....	8,492,619	4,124,026.04	1,863,450.28	1,934,210.23	570,932.45
Texas.....	24,244,024	10,710,542.07	5,212,530.13	5,620,455.24	2,700,496.56
Utah.....	4,194,708	2,295,679.72	657,221.88	1,018,704.93	223,101.47
Vermont.....	1,867,573	912,174.61	500,509.00	438,880.00	16,009.39
Virginia.....	7,416,757	3,471,555.25	1,861,920.03	1,652,964.06	430,317.66
Washington.....	6,115,867	3,040,009.78	1,960,021.92	1,073,983.31	41,851.99
West Virginia.....	4,474,234	1,945,733.43	1,201,103.25	1,046,755.17	280,642.15
Wisconsin.....	9,724,881	4,578,428.21	2,487,464.62	2,295,740.74	363,247.43
Wyoming.....	4,501,327	2,229,816.75	1,012,380.87	1,125,332.00	133,797.38
District of Columbia.....	1,918,469	-----	953,096.04	959,028.70	6,344.26
Hawaii.....	1,871,062	1,682,967.22	-----	177,717.69	10,377.09
Total.....	394,000,000	177,919,032.01	103,348,260.13	86,125,945.36	26,606,762.50

The amounts paid to the several States for work done under the Recovery Act appropriation are given in table 9. These amounts do not include \$35,275,000 advanced to 32 States, the District of Columbia, and Hawaii to provide revolving funds for direct payment of amounts due for work done, nor do they include amounts due for work completed in other States for which at the time the Federal Government had not made reimbursement.

TABLE 9.—*Amounts paid to the States from Public Works highway funds provided by section 204 of the National Industrial Recovery Act, to June 30, 1934*

State	Amount	State	Amount	State	Amount
Alabama.....	\$1,897,468.23	Massachusetts....	\$1,478,810.68	Rhode Island.....	\$538,181.34
Arizona.....	2,588,102.48	Michigan.....	2,924,506.92	South Carolina.....	1,557,411.43
Arkansas.....	1,674,465.29	Minnesota.....	3,937,230.10	South Dakota.....	1,345,689.59
California.....	4,570,381.71	Mississippi.....	1,333,164.99	Tennessee.....	2,692,653.22
Colorado.....	3,217,748.86	Missouri.....	4,476,949.44	Texas.....	9,258,492.53
Connecticut.....	763,678.42	Montana.....	3,443,719.02	Utah.....	2,362,403.72
Delaware.....	406,303.82	Nebraska.....	3,270,749.41	Vermont.....	485,450.45
Florida.....	2,983,546.61	Nevada.....	2,120,654.76	Virginia.....	1,557,676.29
Georgia.....	2,851,850.61	New Hampshire.....	535,010.21	Washington.....	2,747,160.15
Idaho.....	1,859,379.43	New Jersey.....	1,313,467.55	West Virginia.....	1,611,570.57
Illinois.....	2,280,937.40	New Mexico.....	2,247,289.75	Wisconsin.....	2,858,737.46
Indiana.....	1,185,655.28	New York.....	5,321,487.84	Wyoming.....	1,569,632.58
Iowa.....	4,015,611.46	North Carolina.....	2,565,598.68	Hawaii.....	361,946.00
Kansas.....	5,462,560.14	North Dakota.....	1,148,440.28	District of Co- lumbia.....	846,671.08
Kentucky.....	3,136,992.52	Ohio.....	5,251,474.89	Total.....	1 123,754,297.00
Louisiana.....	1,662,460.54	Oklahoma.....	3,674,089.52		
Maine.....	1,441,460.71	Oregon.....	2,324,174.84		
Maryland.....	495,358.56	Pennsylvania.....	4,099,839.64		

¹ In addition, \$35,275,000 had been advanced to 32 States, the District of Columbia, and Hawaii to provide revolving funds from which payments are made directly.

By the Hayden-Cartwright Act, approved June 18, 1934, there was authorized to be appropriated \$200,000,000 to be apportioned and otherwise administered in a manner similar to but not exactly like the \$400,000,000 fund granted by the Recovery Act. This sum was apportioned on June 19, 1934, as shown in table 10, and at the end of the fiscal year further progress toward expenditure of the money awaited issuance of the rules and regulations.

TABLE 10.—*Apportionment of Public Works highway appropriation authorized by the act of June 18, 1934*

State	Amount	State	Amount	State	Amount
Alabama.....	\$4,259,842	Massachusetts....	\$3,350,474	Rhode Island.....	\$1,014,572
Arizona.....	2,641,935	Michigan.....	6,452,568	South Carolina.....	2,770,954
Arkansas.....	3,428,049	Minnesota.....	5,425,551	South Dakota.....	3,047,643
California.....	7,932,206	Mississippi.....	3,540,227	Tennessee.....	4,302,991
Colorado.....	3,486,006	Missouri.....	6,173,740	Texas.....	12,291,253
Connecticut.....	1,454,868	Montana.....	3,769,734	Utah.....	2,132,691
Delaware.....	923,395	Nebraska.....	3,964,364	Vermont.....	948,007
Florida.....	2,661,343	Nevada.....	2,302,356	Virginia.....	3,765,387
Georgia.....	5,113,491	New Hampshire.....	969,462	Washington.....	3,106,412
Idaho.....	2,277,486	New Jersey.....	3,220,879	West Virginia.....	2,280,335
Illinois.....	8,921,401	New Mexico.....	2,941,700	Wisconsin.....	4,941,837
Indiana.....	5,088,963	New York.....	11,327,921	Wyoming.....	2,287,712
Iowa.....	5,118,361	North Carolina.....	4,840,941	District of Columbia.....	973,842
Kansas.....	5,117,675	North Dakota.....	2,938,967	Hawaii.....	949,778
Kentucky.....	3,818,311	Ohio.....	7,865,012	Total.....	200,000,000
Louisiana.....	2,963,932	Oklahoma.....	4,685,180		
Maine.....	1,711,586	Oregon.....	3,097,814		
Maryland.....	1,810,058	Pennsylvania.....	9,590,788		

PROGRESS IN FEDERAL-AID ROAD CONSTRUCTION

Although the expenditure of Federal-aid road funds was far less during the year 1934 than in any other recent year, the largest portion of the mileage on which construction was completed during the year was that built under the Federal-aid plan. The large completion was due to the fact that many projects approved under the Federal-aid apportionments were far advanced when the year began and the small expenditure was due to the fact that the near approach to obligation of all apportioned funds cut off the development of new projects to replace those completed.

Initial Federal-aid improvements were made during the fiscal year on 9,192.3 miles of the Federal-aid highway system; advanced stages of improvement were constructed on 5,583.6 miles; and 4.3 miles previously improved were reconstructed. The total Federal-aid construction completed was therefore 14,780.2 miles. The result of the year's work in this single class of activity was greater than the whole mileage improved during the preceding year, which was 13,255.3 miles, and was exceeded only by the mileage improved in the fiscal year 1932.

The improvements classed as completed and included in the above mileage figures are not only physically completed but have also been paid for by the Federal Government to the full extent of its obligation.

The distribution of the completed mileage by States, its total cost, and the Federal-aid involved are shown in table 11. For the country as a whole, the total cost was \$237,972,675 of which \$84,592,580 was paid from Federal-aid funds and the balance from Federal emergency and State funds.

TABLE 11.—*Total cost, Federal aid, and mileage of Federal-aid roads, initial and stage construction, and reconstruction completed and paid for during the fiscal year 1934*

State	Total cost	Federal aid	Mileage		
			Initial	Stage	Total
Alabama.....	\$3,482,092.33	\$1,720,016.26	120.3	55.2	175.5
Arizona.....	3,670,947.12	1,746,922.45	94.9	250.9	345.8
Arkansas.....	4,941,959.54	2,349,176.78	153.6	115.1	268.7
California.....	7,877,209.25	1,840,782.69	153.0	34.4	187.4
Colorado.....	4,666,410.98	2,155,405.48	181.3	125.7	307.0
Connecticut.....	1,661,827.34	673,119.47	32.9	7.2	40.1
Delaware.....	811,533.07	178,968.52	30.9	14.4	45.3
Florida.....	5,282,492.80	2,382,797.19	130.7	14.4	145.1
Georgia.....	4,815,820.88	1,837,986.16	116.3	198.1	314.4
Idaho.....	2,159,567.85	761,075.68	90.1	148.8	238.9
Illinois.....	12,820,215.21	4,217,703.01	406.4	48.8	455.2
Indiana.....	6,623,398.08	2,125,386.18	314.2	30.9	345.1
Iowa.....	5,053,779.35	862,583.58	253.1	66.8	319.9
Kansas.....	4,959,012.02	1,510,076.50	294.1	181.2	475.3
Kentucky.....	5,486,235.06	1,908,812.10	189.6	175.5	365.1
Louisiana.....	4,844,155.95	2,041,903.02	38.8	34.4	73.2
Maine.....	2,399,342.03	667,599.68	70.2	2.5	72.7
Maryland.....	1,739,445.09	358,958.61	66.9	1.5	68.4
Massachusetts.....	4,088,522.85	1,252,601.31	47.6	-----	47.6
Michigan.....	7,861,473.23	2,888,473.88	310.5	107.7	418.2
Minnesota.....	6,471,799.78	1,064,307.73	213.7	200.2	413.9
Mississippi.....	3,047,926.43	1,462,623.00	104.0	79.0	183.0
Missouri.....	4,499,358.53	801,780.41	214.5	31.1	245.6
Montana.....	4,992,163.37	2,795,391.22	383.9	312.6	696.5
Nebraska.....	6,317,474.80	2,896,730.18	183.8	166.3	350.1
Nevada.....	3,105,090.55	1,306,233.41	94.3	272.7	367.0
New Hampshire.....	957,756.11	379,664.74	22.8	3.4	26.2
New Jersey.....	4,041,116.02	1,369,305.81	39.7	3	40.0
New Mexico.....	4,618,731.38	2,048,371.47	275.4	155.6	431.0
New York.....	12,779,829.99	4,076,917.97	333.8	36.4	370.2
North Carolina.....	5,235,750.65	2,519,493.79	601.6	35.2	636.8
North Dakota.....	3,560,912.11	1,346,546.63	401.4	734.9	1,136.3
Ohio.....	8,247,547.28	2,276,698.32	201.6	68.4	270.0
Oklahoma.....	6,422,142.63	2,254,905.50	377.8	81.2	459.0
Oregon.....	4,315,366.78	1,606,011.70	109.5	102.4	211.9
Pennsylvania.....	11,491,797.67	3,728,345.46	348.2	14.1	362.3
Rhode Island.....	1,053,589.24	325,973.76	22.5	14.5	27.0
South Carolina.....	1,990,019.56	745,108.25	77.9	87.6	165.5
South Dakota.....	2,773,970.34	961,978.11	226.8	320.6	547.4
Tennessee.....	4,561,824.34	2,179,750.25	147.9	51.8	199.7
Texas.....	19,089,447.91	6,831,199.02	684.8	707.4	1,392.2
Utah.....	2,141,122.41	917,916.87	152.8	117.2	270.0
Vermont.....	669,158.92	87,446.51	29.7	6.5	36.2
Virginia.....	3,391,055.49	1,480,123.24	159.7	56.0	215.7
Washington.....	3,592,792.73	1,115,686.14	122.2	16.5	138.7
West Virginia.....	2,672,830.24	1,123,570.00	97.3	8.2	105.5
Wisconsin.....	5,854,771.57	1,458,331.96	159.6	106.7	266.3
Wyoming.....	2,968,770.48	913,848.98	262.4	197.6	460.0
Hawaii.....	1,863,119.46	1,037,971.22	47.3	-----	47.3
Total.....	237,972,674.80	84,592,580.20	9,192.3	5,587.9	14,780.2

¹ Includes 4.3 miles of reconstruction.

The classification of the completed mileage by types of surface improvement is shown in table 12.

TABLE 12.—Mileage of Federal-aid roads, by types of construction, completed and final payment made, during the fiscal year 1934

State	Graded and drained	Sand-clay		Gravel		Macadam		Low-cost bituminous mix	Bituminous macadam	Bituminous concrete	Port-land cement concrete	Block	Bridges and approaches	Totals		
		Un-treated	Treated	Un-treated	Treated	Un-treated	Treated							Initial	Stage	Total
Alabama	74.6							9.4		14.4	75.8		1.3	120.3	55.2	175.5
Arizona	26.5			87.9				228.7					2.7	228.7	94.9	345.8
Arkansas	37.4			27.6	36.7			26.1			139.6		1.3	153.6	115.1	268.7
California	17.2			4.3				63.9		32.5	63.7		5.8	153.0	34.4	187.4
Colorado	7.6			161.4				96.9		1.2	31.8		8.1	181.3	125.7	307.0
Connecticut				8.6					6.9		23.5		1.1	32.9	7.2	40.1
Delaware	2.4									6	42.3			30.9	14.4	45.3
Florida	55.4						43.9			5.2	33.4		7.2	130.7	14.4	145.1
Georgia	55.8		18.8				100.4	3.5		15.9	81.5		1.6	116.3	198.1	314.4
Idaho				94.7				143.0					1.2	90.1	148.8	238.9
Illinois	29.2										420.6		5.4	406.4	48.8	455.2
Indiana	39.3										305.8			314.2	30.9	345.1
Iowa	30.2			116.3							172.3			253.1	66.8	319.9
Kansas	161.3			18.9				135.9	.3		26.6		3.3	294.1	181.2	475.3
Kentucky	113.3			93.4				12.4		26.6	118.2		1.2	189.6	175.5	365.1
Louisiana	5.3			1.5							63.8		2.6	38.8	34.4	73.2
Maine														9	70.2	72.7
Maryland	4.3			6.1	27.8			14.2		12.3	22.2		.2	66.9	1.5	68.4
Massachusetts								12.7		22.7	229.4		1.4	47.6		47.6
Michigan	107.0			52.5				5.8		8.7	215.0		.8	310.5	107.7	418.2
Minnesota	192.3			6.6							75.5			213.7	200.2	413.9
Mississippi	97.2										123.9		1.6	104.0	79.0	183.0
Missouri	30.4			89.7							2.4		1.6	214.5	31.1	245.6
Montana	122.4			371.7				200.0			183.8		5.9	383.9	312.6	696.5
Nebraska	121.9	46.0						62.5			113.8			94.3	272.7	350.1
Nevada				141.5				213.7	1.8	5.4	5.0		1.4	22.8	3.4	26.2
New Hampshire							9.1		.1		14.9		1.6	39.7	3	40.0
New Jersey	3.7										34.6		4.3	275.4	155.6	431.0
New Mexico	44.1			176.8	15.0			178.0		9.2	3.6			303.6	36.4	370.2
New York	43.3			10.8	6.2			.9		36.2	256.6		.8	631.8	35.2	636.8
North Carolina	28.8			110.9	72.4			88.2	14.3	20.7	1.2		2.5	393.6	36.4	430.0
North Dakota	432.8			544.0			49.7	149.3		1.4	8.0		8.8	401.4	734.9	1,136.3
Ohio	7.3			1.6			.2		.4	77.6	136.3	40.2	5.2	201.6	68.4	270.0
Oklahoma	323.7										131.4		3.9	377.8	81.2	459.0
Oregon	63.3			63.4	4.3			1.2	38.4	6.2	19.3		2.1	109.5	102.4	211.9
Pennsylvania	26.4			3.2			142.9	16.8		24.0	147.1		1.9	348.2	14.1	362.3
Rhode Island									11.9	3.3	11.7			22.5	4.5	27.0
South Carolina				25.3							46.3		.4	77.9	87.6	165.5
South Dakota	183.0			248.4				93.1		46.9	22.5		.4	226.8	320.6	547.4
Tennessee	60.3									46.5	90.0		2.5	147.9	51.8	199.7
Texas	489.0			98.7	210.0			77.6		46.5	431.4	3.1	8.7	684.8	707.4	1,392.2
Utah	1.3			175.2			104.8			3.8	11.0		1.1	152.8	117.2	270.0

TABLE 12.—*Mileage of Federal-aid roads, by types of construction, completed and final payment made, during the fiscal year 1934—Con.*

State	Graded and drained	Sand-clay		Gravel		Macadam		Low-cost bituminous mix	Bituminous macadam	Bituminous concrete	Portland cement concrete	Block	Bridges and approaches	Totals		
		Un-treated	Treated	Un-treated	Treated	Un-treated	Treated							Initial	Stage	Total
Vermont.....	40.8	61.6	---	19.3	---	---	---	16.0	---	---	1	---	.8	29.7	6.5	36.2
Virginia.....	11.9	---	---	9.4	---	63.6	4.5	23.6	---	11.1	23.6	---	1.1	159.7	56.0	215.7
Washington.....	55.6	---	---	117.3	---	---	---	8.5	---	---	---	---	1.0	122.2	16.5	138.7
West Virginia.....	48.1	---	---	---	.5	---	19.1	29.9	---	---	---	---	.4	97.3	8.2	105.5
Wisconsin.....	203.5	---	---	23.2	---	---	---	117.5	---	---	193.1	---	1.9	159.6	106.7	266.3
Wyoming.....	---	---	---	137.5	---	---	---	---	---	---	---	---	1.5	262.4	197.6	460.0
Hawaii.....	---	---	---	---	---	1.9	---	---	45.1	---	---	---	.3	47.3	---	47.3
Total.....	3,397.9	377.7	215.6	3,022.4	433.1	263.1	326.7	1,925.6	169.4	438.9	4,061.6	44.4	103.8	9,192.3	5,587.9	14,780.2

In addition to the projects completed and paid for, there were others on which at the end of the year all construction work was completed to the satisfaction of the Bureau, as determined by final inspection, and only the final payment by the Federal Government remained to be made before classifying them as completed. In this report these projects are classified with those under construction and approved for construction at the close of the year.

Together, the projects in these three stages, representing the active Federal-aid improvement program at the end of the year, involved only 2,920.6 miles, as compared with a total of 16,481.3 miles the previous year. The large decrease is the result of the near approach to complete obligation of the available Federal-aid funds.

Of the total of 2,920.9 miles in the current program at the end of the year 2,054.2 miles were in course of initial improvement and 866.7 miles were in course of stage construction active or planned.

The distribution, by States, of the Federal-aid mileage in the three stages of progress toward completion is shown in table 13, together with estimated total costs and the amounts of Federal aid allotted. As in the case of the completed projects the difference between the total cost and the Federal aid will be supplied from Federal emergency-construction funds and State funds. For the country as a whole, the estimated cost of the projects in progress toward completion at the end of the year was \$77,147,811; the Federal aid allotted, \$31,525,545.

TABLE 13.—*Total cost, Federal aid, and mileage of Federal-aid roads, initial and stage improvement, finally inspected, under construction and approved for construction, June 30, 1934*¹

State	Estimated total cost	Federal aid allotted	Mileage		
			Initial	Stage	Total
Alabama.....	\$2,454,570.98	\$1,227,320.42	38.1	64.8	102.9
Arizona.....	268,627.34	218,523.09	2.2	8.7	10.9
Arkansas.....	1,642,344.71	784,865.87	97.0	36.9	133.9
California.....	1,660,884.60	459,033.28	25.5	3.4	28.9
Colorado.....	1,279,941.78	630,203.93	56.9	5.6	62.5
Connecticut.....	2,592,964.59	1,059,366.62	13.8	-----	13.8
Delaware.....	138,879.50	25,512.72	-----	7.2	7.2
Florida.....	2,434,960.51	1,134,981.14	62.2	-----	62.2
Georgia.....	836,784.27	283,492.29	31.5	19.1	50.6
Idaho.....	841,099.57	293,196.85	21.5	48.0	69.5
Illinois.....	9,055,119.93	4,031,115.14	246.7	22.6	269.3
Indiana.....	4,698,920.96	2,068,678.36	100.6	.8	101.4
Kentucky.....	425,699.14	170,746.35	7.6	16.4	24.0
Louisiana.....	2,487,790.47	1,176,664.98	7.8	.4	8.2
Maryland.....	155,884.65	20,284.20	2.5	-----	2.5
Massachusetts.....	3,460,290.04	770,604.17	46.7	4.9	51.6
Michigan.....	2,208,873.05	922,230.00	84.5	24.8	109.3
Minnesota.....	2,433,519.01	837,447.31	43.8	53.3	97.1
Mississippi.....	5,006,100.00	2,496,082.83	130.3	108.7	239.0
Missouri.....	307,318.26	73,274.28	3.3	-----	3.3
Montana.....	1,659,836.98	921,663.27	84.3	75.7	160.0
Nebraska.....	273,047.54	134,200.56	-----	6.1	6.1
New Hampshire.....	210,985.67	75,692.99	2.5	2.2	4.7
New Jersey.....	2,937,392.79	908,098.69	28.1	-----	28.1
New Mexico.....	47,997.80	23,998.90	.2	-----	.2
New York.....	6,841,839.60	2,250,655.00	185.3	3.1	188.4
North Carolina.....	430,742.98	221,757.73	29.5	-----	29.5
North Dakota.....	1,139,400.00	561,797.08	24.3	37.7	62.0
Ohio.....	1,897,810.00	284,369.55	14.0	-----	14.0
Oklahoma.....	1,595,488.10	730,253.20	58.3	26.7	85.0
Oregon.....	724,371.08	330,945.45	14.3	18.5	32.8
Pennsylvania.....	2,459,609.53	699,447.05	82.3	-----	82.3
South Carolina.....	1,752,527.54	661,593.99	84.4	79.1	163.5
South Dakota.....	636,255.57	333,547.32	71.8	25.9	97.7
Tennessee.....	1,154,501.80	575,824.91	24.7	19.5	44.2
Texas.....	2,451,977.26	975,130.76	74.1	48.6	122.7
Utah.....	1,183,396.65	542,563.03	43.6	59.7	103.3
Vermont.....	32,523.66	3,429.60	1.4	-----	1.4
Virginia.....	2,869,150.19	1,311,752.06	126.5	25.5	152.0
Washington.....	507,644.68	84,810.39	5.4	-----	5.4
West Virginia.....	1,131,772.11	432,682.77	42.1	-----	42.1
Wisconsin.....	53,938.65	4,000.00	1.3	-----	1.3
Wyoming.....	134,314.83	64,000.00	6.2	12.8	19.0
Hawaii.....	1,130,712.54	709,706.82	27.1	-----	27.1
Total.....	77,147,810.91	31,525,544.95	2,054.2	866.7	2,920.9

¹ No mileage in this status in Iowa, Kansas, Maine, Nevada, and Rhode Island.

The classification of the projects in the active program by types of surface improvement is shown in table 14.

The total mileage, improved with Federal aid from the inauguration of the policy in 1916 to the end of the fiscal year was 119,712 miles. As explained in previous annual reports this total does not include mileage improved but since reduced or eliminated by relocations, mileage initially improved but currently undergoing stage construction and other mileage off the Federal-aid system for which substitutions on the system have been made.

Table 15 shows in parallel columns the mileage by States included in the designated Federal-aid highway system and the mileage improved with Federal aid to June 30, 1934. The total mileage in the system was 207,231; and, as the table shows, more than half of it has been improved with Federal aid.

TABLE 15.—*Mileage of designated Federal-aid highway system, in each State, and mileage improved with Federal aid to June 30, 1934*

State	Mileage of designated Federal-aid highway system	Mileage improved with Federal aid to June 30, 1934	State	Mileage of designated Federal-aid highway system	Mileage improved with Federal aid to June 30, 1934
Alabama.....	3,933	2,585.6	New Hampshire.....	988	460.5
Arizona.....	1,979	1,452.0	New Jersey.....	1,447	683.0
Arkansas.....	4,953	2,198.8	New Mexico.....	3,678	2,523.8
California.....	5,214	2,703.3	New York.....	8,118	3,922.0
Colorado.....	3,659	2,017.1	North Carolina.....	5,735	2,940.7
Connecticut.....	1,019	330.9	North Dakota.....	7,420	6,082.7
Delaware.....	754	413.6	Ohio.....	5,914	3,290.0
Florida.....	2,478	787.7	Oklahoma.....	6,049	2,806.8
Georgia.....	5,610	3,518.2	Oregon.....	3,795	1,802.3
Idaho.....	3,265	1,778.1	Pennsylvania.....	7,132	3,638.8
Illinois.....	7,498	3,568.1	Rhode Island.....	493	298.7
Indiana.....	4,930	2,369.4	South Carolina.....	3,545	2,258.4
Iowa.....	7,405	3,831.5	South Dakota.....	6,289	4,762.2
Kansas.....	7,920	4,305.1	Tennessee.....	3,982	1,925.1
Kentucky.....	3,701	2,190.9	Texas.....	12,513	9,136.1
Louisiana.....	2,742	1,673.3	Utah.....	1,787	1,474.5
Maine.....	1,588	889.4	Vermont.....	1,036	421.3
Maryland.....	2,177	912.2	Virginia.....	3,851	2,223.7
Massachusetts.....	1,504	935.0	Washington.....	3,177	1,449.3
Michigan.....	5,259	2,719.3	West Virginia.....	2,223	1,046.2
Minnesota.....	6,895	4,595.3	Wisconsin.....	5,557	3,002.3
Mississippi.....	3,709	2,095.1	Wyoming.....	3,565	2,496.6
Missouri.....	7,432	3,441.0	Hawaii.....	532	141.2
Montana.....	5,510	3,491.6			
Nebraska.....	5,594	4,580.0			
Nevada.....	1,677	1,543.7	Total.....	207,231	119,712.4

Classification of the 119,712 miles of completed federally aided roads as of June 30, by States and by types of surface improvement is shown in table 16.

TABLE 16.—Mileage of Federal-aid roads, improved, by types of construction, by States, June 30, 1934

State	Graded and drained	Sand-clay		Gravel		Macadam		Low-cost bituminous mix	Bituminous macadam	Bituminous concrete	Portland cement concrete	Block	Bridges and approaches	Total
		Un-treated	Treated	Un-treated	Treated	Un-treated	Treated							
Alabama.....	260.8	490.0		899.6	4.5		16.3	37.0	62.8	173.2	610.1		31.3	2,585.6
Arizona.....	24.7	29.9		379.9				884.5	.8	38.9	110.7		12.6	1,452.0
Arkansas.....	98.5			922.0	36.7	41.1	87.4	503.1		266.0	677.7		27.0	2,198.8
California.....	456.3			456.3		31.4		503.1	110.1	344.5	795.4		20.1	2,703.3
Colorado.....	184.6	47.5		874.5		17.2	.1	336.6	49.6	15.6	439.9		30.1	2,017.1
Connecticut.....				8.8									7.0	330.9
Delaware.....	2.4			30.3				11.7		6.0	355.5		1.5	413.6
Florida.....	56.1	15.5			1.0	85.4	156.3		72.6	84.3	292.0		14.3	787.7
Georgia.....	316.1	798.8		383.5	34.9	52.3	413.4	38.5	226.9	133.8	1,067.7		30.5	3,518.2
Idaho.....	176.7			647.7		157.7		626.9	20.3	92.7	49.0		7.1	1,778.1
Illinois.....	153.7								3.4	3.2	3,360.7		15.1	3,568.1
Indiana.....	42.6			90.2					17.0	12.0	2,193.3		7.7	2,369.4
Iowa.....	1,136.3			542.4				608.5	129.9	10.7	2,127.2		3.6	3,851.5
Kansas.....	1,173.1	709.6		329.9	115.1			38.1	84.3	234.4	1,036.8		27.0	4,305.1
Kentucky.....	603.4			502.2		16.2	50.3		3.2	41.8	649.8		8.3	2,190.9
Louisiana.....	68.6			1,275.3					240.8		264.5		19.9	1,673.3
Maine.....	236.4			236.4	191.5				272.2		216.4		4.3	889.4
Maryland.....	9.2			45.0		.2	3.9		67.8		512.9		1.0	912.2
Massachusetts.....				.4	.4	.2	2.8	22.3	528.1	80.2	289.4		11.2	935.0
Michigan.....	161.0			395.7				5.8	5.4		1,964.2		6.9	2,719.3
Minnesota.....	1,201.7	11.1		1,497.5	17.7					32.7	1,831.5		3.1	4,595.3
Mississippi.....	394.8	15.0		1,143.5		11.1				83.6	411.9		16.4	2,095.1
Missouri.....	429.1			836.2		19.6				20.0	2,083.5		17.7	3,441.0
Montana.....	259.7			2,453.3						13.1	613.6		14.4	3,491.6
Nebraska.....	474.4	3,267.1							5.0	34.6	21.5		18.4	4,580.0
Nevada.....	25.5			460.0	10.1	91.7	96.9	89.0	89.9	31.9	144.2		2.3	1,543.7
New Hampshire.....					.2		.2		.9	22.5	624.5		5.7	400.5
New Jersey.....	23.3			6.0				451.0		9.9	93.2		13.6	2,523.8
New Mexico.....	256.7	19.1		1,665.3	15.0			.9	475.5	190.6	3,005.5		2.9	3,922.0
New York.....	109.5			129.1	6.2			229.3	35.3	308.8	1,073.3		10.5	2,940.7
North Carolina.....	107.5			244.0	102.3	84.4	21.8			26.1			10.0	6,082.7
North Dakota.....	753.9			4,874.5	129.1			286.2		217.3			30.1	3,230.0
Ohio.....	134.0			52.4		105.4	27.3		373.0	217.3	1,635.4		20.9	2,806.8
Oregon.....	828.5			511.2	8.3				276.8	151.0	1,248.0		11.3	1,802.3
Pennsylvania.....	374.5			801.4	34.7	47.7	51.1	17.6	7.7	64.7	122.5		7.8	2,258.4
Rhode Island.....	195.0			3.1		616.0	1.8		106.3	162.1	2,576.3		3.2	3,638.8
South Carolina.....	52.8									185.0	755.6		24.9	2,258.4
South Dakota.....	281.4	34.0		101.0	28.7			232.9	.3	4.9	170.0		7.7	4,762.2
Tennessee.....	241.3			106.2	46.1				341.8	273.2	888.0		13.2	1,925.1
Texas.....	1,246.7	21.1		2,671.1	657.9	61.4	328.4		519.6	856.1	2,669.1		64.3	9,136.1

TABLE 16.—*Mileage of Federal-aid roads, improved, by types of construction, by States, June 30, 1934—Continued*

State	Graded and drained	Sand-clay		Gravel		Macadam		Low-cost bituminous mix	Bituminous macadam	Bituminous concrete	Portland cement concrete	Block	Bridges and approaches	Total
		Un-treated	Treated	Un-treated	Treated	Un-treated	Treated							
Utah.....	98.9			440.1	7.4	270.7		502.6	4.5	18.2	128.1		4.6	1,474.5
Vermont.....	262.4			128.2	2.0	1.1		32.2	61.2		188.6		8.0	421.3
Virginia.....	256.0	400.3	13.7	118.4	5.2	386.5	46.0		386.2	63.5	527.4		12.1	2,223.7
Washington.....	340.3			693.9							491.5		7.9	1,449.3
West Virginia.....	215.4	19.0		33.7	5	19.5	25.9	1.4	200.1	28.1	382.5	10.3	3.9	1,046.2
Wisconsin.....	532.7	10.2		892.3	15.8				13.8	22.1	1,833.4		12.2	3,002.3
Wyoming.....				1,269.3				631.5	1.7		17.4		11.7	2,496.6
Hawaii.....						1.9			105.5	13.3	19.0		1.5	141.2
Total.....	14,007.1	7,375.1	396.0	33,137.4	1,471.3	2,304.8	1,373.6	7,385.8	4,860.5	4,639.1	41,012.1	1,097.2	652.4	119,712.4

CHANGES IN THE FEDERAL-AID HIGHWAY SYSTEM

In the last annual report the mileage of the Federal-aid system within the boundaries of national forests, Indian reservations, and other Federal reservations was reported as 6,224 miles, as determined up to the close of the fiscal year 1933. During the past year this mileage has been increased to 6,262 miles by the addition to the system of new routes in several States, portions of which lie within the various kinds of reservations. The added mileage was actually 14 miles greater than the difference between the two annual totals, because of the fact that the mileage in Oregon was reduced by that amount, from 495 to 481 miles. The location, by States, of the mileage within Federal reservations is shown in table 17.

TABLE 17.—Mileage of Federal-aid highway system within Federal reservations, being the amounts by which the 7-percent limiting mileage may be exceeded in each State as of June 30, 1934

State	Mileage within Federal reservations	State	Mileage within Federal reservations	State	Mileage within Federal reservations
Arizona.....	547	Minnesota.....	75	Pennsylvania.....	108
Arkansas.....	120	Mississippi.....	10	South Dakota.....	477
California.....	465	Montana.....	1,069	Tennessee.....	66
Colorado.....	438	Nebraska.....	21	Utah.....	103
Georgia.....	58	Nevada.....	22	Virginia.....	49
Idaho.....	558	New Hampshire.....	33	Washington.....	440
Illinois.....	5	New Mexico.....	368	West Virginia.....	29
Iowa.....	2	New York.....	16	Wisconsin.....	46
Kansas.....	15	North Carolina.....	176	Wyoming.....	326
Kentucky.....	6	North Dakota.....	23		
Maine.....	5	Oklahoma.....	48	Total.....	6,262
Michigan.....	57	Oregon.....	1 481		

¹ Due to more accurate measurements and relocations there is a reduction of 14 miles from the previous figure.

By amendment of the Federal Highway Act, approved May 21, 1928, the original 7-percent system may be increased by those mileages within Federal reservations, and such addition, together with an increase in the mileage of the system in Hawaii authorized by a special act approved February 23, 1931, raises the permissible mileage of the initial system to 207,143 miles.

The permissible Federal-aid-system mileage has been further increased by additions to the initial 7-percent mileage in States where provision has been made for the completion and maintenance of 90 percent of the original system, as provided by the Emergency Relief and Construction Act of 1932. Such extensions have been made in Connecticut, Delaware, Florida, Illinois, Maryland, Massachusetts, Nevada, New Jersey, New York, North Carolina, Oregon, Pennsylvania, Rhode Island, and Virginia; amounting in the 14 States to 10,644 miles. The total permissible mileage of the Federal-aid system, as of June 30, 1934, was raised by this further addition to 217,787 miles. As shown in table 15, the amount actually designated and approved by the Secretary of Agriculture up to June 30, was 207,231 miles.

PROGRESS IN PUBLIC WORKS HIGHWAY CONSTRUCTION

The National Industrial Recovery Act contained a provision authorizing grants to be made in amount not less than \$400,000,000 to be expended in general accordance with the Federal Highway Act for improvement of roads included in the Federal-aid highway system and extensions thereof into and through municipalities and for improvement of secondary or feeder roads.

The allotment for this purpose was made through the Special Board for Public Works on June 22, 1933, and the allotted funds were apportioned by the Secretary of Agriculture with the approval of the special board on June 23. Rules and regulations to govern the expenditure of the money were issued on the same day, and the preliminary work of submission and approval of programs was accomplished as rapidly as was to be expected in view of the existing circumstances.

Work on the first project to be approved was begun in Utah on August 5 and thereafter the beginning of work followed rapidly in all States. In the course

of the year construction was begun on 20,660 miles of road and completed on 6,986 miles, leaving 13,674 miles under construction on June 30, 1934. On the same date projects approved for construction included 1,718 miles, so that there was included in the year's active program a total of 22,378 miles.

The total cost of the projects completed during the year was \$79,774,036. The estimated total cost of the projects under construction at the close of the year was \$283,506,260; and that of the projects approved for construction at the same time was \$36,312,064, making a total for the year's active program of \$399,592,360.

Of the 6,986 miles in completed projects 4,363 miles was located on the Federal-aid highway system outside of municipalities. The improvement of this mileage cost \$46,283,443, of which \$41,194,237 was paid from Public Works funds, \$2,499,221 from Federal-aid funds and the remainder from Federal emergency construction and State funds.

Four hundred and sixty-nine miles, costing \$17,297,070 was on extensions of the Federal-aid system into and through municipalities. Of the total cost of this mileage the Public Works funds provided \$16,707,715 and Federal-aid funds \$145,863, the balance from the other above-mentioned sources.

The remaining completed mileage—2,154 miles costing \$16,193,523—consisted of secondary and feeder roads. The cost of these was met to the extent of \$15,300,038 from Public Works funds and the balance was paid from State funds. Federal-aid and emergency-construction funds were not available for this portion of the work because the roads improved are in no case included in the Federal-aid system.

The distribution, by States, of the completed mileage in each of the three classes of projects is given in table 18, together with the total costs of the roads built and the amounts paid from Public Works and Federal-aid funds.

TABLE 18.—*Total cost and mileage of Public Works highway projects completed to June 30, 1934, and Federal funds allotted thereto, by States*

PROJECTS ON THE FEDERAL-AID SYSTEM OUTSIDE OF MUNICIPALITIES¹

State	Total cost	Federal funds allotted		Mileage
		Public Works funds	Federal-aid funds	
Alabama.....	\$1,596,441.15	\$880,571.63	\$715,869.52	61.9
Arizona.....	1,776,203.88	1,735,542.70	-----	131.1
Arkansas.....	299,964.82	200,126.94	99,837.88	9.5
California.....	3,837,155.68	2,954,376.75	-----	142.5
Colorado.....	1,514,031.69	1,500,790.30	-----	96.0
Connecticut.....	31,798.76	31,798.76	-----	.1
Delaware.....	192,063.14	191,170.71	-----	3.0
Florida.....	1,281,060.88	814,074.82	466,986.06	43.7
Georgia.....	1,232,521.05	1,232,521.05	-----	73.6
Idaho.....	824,604.86	809,780.19	-----	81.8
Illinois.....	50,872.54	50,872.54	-----	.9
Iowa.....	1,057,700.42	1,038,800.00	-----	74.5
Kansas.....	1,330,234.56	1,329,365.58	-----	206.5
Kentucky.....	554,103.01	549,646.72	-----	59.6
Louisiana.....	222,415.49	222,390.49	-----	9.7
Massachusetts.....	289,573.84	212,377.94	69,984.24	6.4
Michigan.....	80,150.00	80,150.00	-----	1.8
Minnesota.....	2,488,707.73	2,468,224.86	20,482.87	509.5
Mississippi.....	288,524.53	164,210.19	124,314.34	12.8
Missouri.....	895,421.61	695,097.86	-----	43.5
Montana.....	1,426,917.20	1,246,901.20	100,000.00	93.4
Nebraska.....	2,122,823.42	1,535,019.12	108,538.00	215.8
Nevada.....	1,349,395.18	1,349,395.18	-----	173.0
New Hampshire.....	52,024.43	52,024.43	-----	.3
New Jersey.....	66,077.87	66,077.87	-----	6.1
New Mexico.....	1,873,447.55	1,873,447.55	-----	210.5
New York.....	510,222.64	410,162.64	43,000.00	8.0
North Carolina.....	1,037,299.11	714,521.55	322,777.56	103.5
North Dakota.....	1,050,552.17	1,047,220.19	3,294.32	457.9
Ohio.....	1,035,375.47	1,030,181.63	-----	27.8
Oklahoma.....	1,239,211.18	1,237,607.64	-----	101.4
Oregon.....	1,525,235.01	1,392,618.01	84,317.50	98.9
Pennsylvania.....	254,788.81	254,421.79	-----	4.4
Rhode Island.....	50,178.00	50,178.00	-----	1.1
South Carolina.....	263,440.39	263,440.39	-----	24.3
South Dakota.....	1,086,296.08	1,066,954.69	19,341.39	184.9

¹ No projects of this class completed in Indiana, Maine, and Maryland.

TABLE 18.—*Total cost and mileage of Public Works highway projects completed to June 30, 1934, and Federal funds allotted thereto, by States—Continued*

PROJECTS ON THE FEDERAL-AID SYSTEM OUTSIDE OF MUNICIPALITIES—Contd.

State	Total cost	Federal funds allotted		Mileage
		Public Works funds	Federal-aid funds	
Tennessee.....	\$1,393,206.06	\$1,180,143.76	\$213,062.30	61.5
Texas.....	4,182,635.90	3,504,691.72		542.4
Utah.....	1,432,093.17	1,429,324.46		146.0
Vermont.....	90,524.22	89,926.93		7.4
Virginia.....	1,101,511.50	1,092,037.47	9,474.03	40.2
Washington.....	884,351.00	879,563.10	3,356.82	44.7
West Virginia.....	211,470.33	211,470.33		6.7
Wisconsin.....	1,073,457.39	1,063,118.67	1,190.00	50.0
Wyoming.....	1,005,126.46	882,673.00	90,400.00	177.9
Hawaii.....	122,232.70	109,225.57	12,994.32	6.3
Total.....	46,283,442.88	41,194,236.92	2,499,221.15	4,362.8

PROJECTS ON EXTENSIONS OF THE FEDERAL-AID SYSTEM INTO AND THROUGH MUNICIPALITIES²

Alabama.....	\$183,974.41	\$183,974.41		3.1
Arizona.....	179,423.43	177,982.55		4.0
Arkansas.....	267,409.01	239,810.94	\$27,598.07	7.0
California.....	1,201,380.99	1,077,458.87		13.8
Colorado.....	890,911.16	845,103.51		17.2
Connecticut.....	48,325.68	48,325.68		.5
Delaware.....	82,851.95	75,106.31		.8
Florida.....	238,246.83	178,494.68	59,752.15	3.6
Georgia.....	270,623.84	270,623.84		12.4
Idaho.....	191,286.86	187,894.42		4.8
Illinois.....	213,649.45	213,618.50		3.7
Indiana.....	49,616.53	49,616.53		1.2
Iowa.....	703,618.21	667,865.00		23.6
Kansas.....	727,167.34	723,495.87		18.5
Kentucky.....	128,112.17	128,112.17		3.2
Louisiana.....	329,889.35	329,889.35		6.5
Maine.....	162,188.29	161,062.72		2.4
Massachusetts.....	96,850.68	73,850.68	23,000.00	1.8
Michigan.....	195,700.00	195,700.00		2.3
Minnesota.....	956,049.40	955,888.84		53.6
Mississippi.....	122,848.45	110,388.95	12,459.50	3.8
Missouri.....	559,179.26	533,233.11		12.7
Montana.....	345,305.18	345,305.18		9.2
Nebraska.....	269,117.63	268,428.34		11.7
Nevada.....	47,203.38	47,203.38		1.2
New Jersey.....	94,073.38	94,073.38		2.1
New Mexico.....	437,759.58	437,759.58		13.1
New York.....	259,723.17	259,341.87		4.0
North Carolina.....	538,701.49	586,560.20	166.10	30.4
North Dakota.....	128,994.64	128,994.64		9.3
Ohio.....	495,616.80	455,579.08		9.4
Oklahoma.....	220,928.88	220,571.20		7.9
Oregon.....	422,188.01	406,695.04	14,126.97	9.8
Pennsylvania.....	778,975.47	761,814.18		16.9
Rhode Island.....	54,063.40	54,063.40		1.2
South Carolina.....	147,768.44	147,768.44		4.1
South Dakota.....	183,149.74	183,149.74		8.1
Tennessee.....	307,829.45	307,829.45		6.7
Texas.....	1,605,904.15	1,523,073.09		56.4
Utah.....	619,858.49	603,798.90		13.9
Vermont.....	41,791.73	41,791.73		1.9
Virginia.....	402,536.67	381,276.18	8,760.49	10.9
Washington.....	1,187,895.49	1,173,567.02		20.7
West Virginia.....	87,291.15	87,291.15		1.9
Wisconsin.....	399,615.60	393,308.77		13.5
Wyoming.....	82,029.39	81,528.69		1.6
District of Columbia.....	289,445.89	289,445.89		2.4
Total.....	17,297,070.49	16,707,715.45	145,863.28	468.8

² No projects of this class completed in Maryland, New Hampshire, and Hawaii.

TABLE 18.—*Total cost and mileage of Public Works highway projects complete to June 30, 1934, and Federal funds allotted thereto, by States—Continued*PROJECTS ON SECONDARY OR FEEDER ROADS ³

State	Total cost	Federal funds allotted		Mileage
		Public Works funds	Federal-aid funds	
Alabama.....	\$26,236.82	\$26,236.82	-----	0.1
Arizona.....	90,857.40	90,857.40	-----	6.3
Arkansas.....	41,727.43	41,727.43	-----	15.9
California.....	617,476.51	497,034.19	-----	16.0
Colorado.....	617,189.08	616,485.80	-----	82.2
Florida.....	397,589.88	397,589.88	-----	26.0
Georgia.....	69,600.63	69,600.63	-----	4.2
Idaho.....	650,200.91	588,778.89	-----	70.8
Illinois.....	276,114.65	276,114.65	-----	42.0
Iowa.....	238,660.03	229,800.00	-----	49.2
Kansas.....	345,683.96	345,683.96	-----	17.2
Kentucky.....	448,942.86	448,876.03	-----	69.0
Louisiana.....	73,405.37	73,405.37	-----	2.4
Maine.....	577,668.36	571,325.97	-----	54.5
Maryland.....	22,217.70	22,217.70	-----	1.9
Michigan.....	88,500.00	88,500.00	-----	7.3
Minnesota.....	573,461.23	561,616.55	-----	81.8
Missouri.....	504,000.61	504,000.61	-----	141.8
Montana.....	712,695.05	712,695.05	-----	97.6
Nebraska.....	213,260.07	213,260.07	-----	70.3
Nevada.....	700,561.17	700,561.17	-----	70.6
New Hampshire.....	82,647.15	82,647.15	-----	2.5
New Mexico.....	351,481.58	351,481.58	-----	62.1
New York.....	333,721.33	333,721.33	-----	11.8
North Carolina.....	690,265.25	689,866.92	-----	51.2
North Dakota.....	6,021.51	6,021.51	-----	1.4
Ohio.....	610,460.00	610,460.00	-----	159.9
Oklahoma.....	31,741.28	31,741.28	-----	2.9
Oregon.....	541,068.81	502,843.61	-----	41.7
Pennsylvania.....	258,906.83	258,906.83	-----	30.0
South Carolina.....	54,313.20	54,313.20	-----	1.6
South Dakota.....	183,741.74	183,741.74	-----	73.2
Tennessee.....	342,701.04	342,701.04	-----	29.3
Texas.....	2,385,381.53	1,835,753.10	-----	408.9
Utah.....	523,984.51	504,437.24	-----	107.3
Virginia.....	518,382.22	498,897.89	-----	96.9
Washington.....	403,092.71	393,092.71	-----	27.6
West Virginia.....	21,945.79	21,945.79	-----	.7
Wisconsin.....	894,060.15	858,749.84	-----	58.8
Wyoming.....	465,442.38	454,233.00	-----	56.6
District of Columbia.....	208,113.99	208,113.99	-----	2.6
Total.....	16,193,522.72	15,300,037.92	-----	2,154.1

³ No projects of this class completed in Connecticut, Delaware, Indiana, Massachusetts, Mississippi, New Jersey, Rhode Island, Vermont, and Hawaii.

Of the 13,674 miles under construction at the end of the year, 6,949 miles were on the Federal-aid system outside of municipalities, 1,121 miles on extensions of the system into and through cities, and 5,605 miles on secondary or feeder roads. The estimated costs of each of these groups of projects, the sources of the funds employed, and the distribution by States are shown in table 19.

TABLE 19.—*Total cost and mileage of Public Works highway projects under construction on June 30, 1934, and Federal funds allotted thereto, by States*

PROJECTS ON THE FEDERAL-AID SYSTEM OUTSIDE OF MUNICIPALITIES¹

State	Estimated total cost	Federal funds allotted		Mileage
		Public Works funds	Federal-aid funds	
Alabama.....	\$4,625,778.67	\$2,588,735.13	\$2,037,043.54	272.3
Arizona.....	2,598,403.90	2,017,309.12	-----	153.2
Arkansas.....	2,721,289.10	2,328,613.72	392,194.13	137.0
California.....	6,084,486.14	4,648,401.55	-----	153.1
Colorado.....	2,059,925.09	1,926,296.72	27,435.65	54.9
Connecticut.....	1,543,762.06	1,367,983.12	175,778.94	30.7
Delaware.....	698,741.30	698,741.30	-----	14.7
Florida.....	1,940,045.73	1,603,752.50	335,683.13	72.3
Georgia.....	2,400,287.81	2,400,287.81	-----	177.5
Idaho.....	1,281,245.97	1,239,392.09	-----	93.5
Illinois.....	2,712,498.06	2,712,498.06	-----	45.1
Indiana.....	4,405,477.21	4,361,358.38	-----	119.5
Iowa.....	4,126,332.98	3,828,980.00	-----	185.6
Kansas.....	3,917,385.48	3,690,045.12	-----	191.1
Kentucky.....	2,599,204.31	2,590,365.88	-----	177.9
Louisiana.....	2,913,268.66	2,406,617.66	-----	67.5
Maine.....	1,515,228.37	1,479,661.42	-----	44.0
Maryland.....	801,143.78	791,495.03	-----	14.9
Massachusetts.....	1,123,369.76	807,710.12	315,659.64	31.4
Michigan.....	5,177,180.00	5,128,180.00	49,000.00	243.8
Minnesota.....	1,980,571.21	1,949,360.33	27,500.00	237.7
Mississippi.....	4,586,982.35	2,481,349.56	2,067,000.85	235.2
Missouri.....	4,390,783.57	4,050,641.00	68,548.60	149.6
Montana.....	3,541,342.66	3,181,685.86	237,025.83	270.5
Nebraska.....	2,961,612.91	2,342,867.69	-----	137.1
Nevada.....	1,401,020.43	1,401,020.43	-----	87.1
New Hampshire.....	601,203.04	594,695.63	-----	10.5
New Jersey.....	2,756,285.14	2,601,364.13	139,466.42	36.4
New Mexico.....	1,064,442.96	920,513.54	143,929.42	60.1
New York.....	11,280,608.68	9,660,723.68	315,000.00	230.0
North Carolina.....	3,310,836.86	2,957,506.09	353,330.77	465.1
North Dakota.....	1,513,926.68	1,315,248.81	198,677.87	404.6
Ohio.....	6,437,458.00	6,133,085.00	51,410.00	159.1
Oklahoma.....	2,931,335.69	2,931,335.69	-----	196.3
Oregon.....	1,623,500.25	1,484,960.05	128,021.20	83.2
Pennsylvania.....	6,079,556.64	5,895,873.50	-----	122.0
Rhode Island.....	937,119.34	937,119.34	-----	19.4
South Carolina.....	2,039,404.99	2,036,675.37	2,729.62	186.3
South Dakota.....	1,849,893.45	1,542,099.63	307,793.82	250.2
Tennessee.....	2,914,317.84	2,553,157.65	361,160.19	104.0
Texas.....	7,415,941.62	6,877,286.38	-----	457.5
Utah.....	798,151.16	798,151.16	-----	48.8
Vermont.....	847,698.77	818,249.22	-----	37.4
Virginia.....	2,115,368.45	1,992,162.00	119,858.30	81.4
Washington.....	2,095,806.01	2,095,806.01	-----	60.9
West Virginia.....	1,706,233.68	1,700,233.68	-----	64.9
Wisconsin.....	3,553,669.34	3,452,135.29	38,500.00	174.3
Wyoming.....	1,423,273.07	1,280,112.23	85,908.57	272.9
Hawaii.....	1,626,253.71	1,325,047.89	251,205.82	26.5
Total.....	141,029,652.88	125,926,891.57	8,229,862.31	6,949.0

¹ No projects of this class under construction in the District of Columbia.

TABLE 19.—*Total cost and mileage of Public Works highway projects under construction on June 30, 1934, and Federal funds allotted thereto, by States—Con.*PROJECTS ON EXTENSIONS OF THE FEDERAL-AID SYSTEM INTO AND THROUGH MUNICIPALITIES ²

State	Estimated total cost	Federal funds allotted		Mileage
		Public Works funds	Federal-aid funds	
Alabama.....	\$1, 133, 335. 74	\$1, 133, 335. 74	-----	38. 0
Arizona.....	300, 059. 89	300, 059. 89	-----	7. 3
Arkansas.....	1, 112, 223. 25	1, 058, 589. 04	\$53, 384. 21	28. 4
California.....	2, 800, 607. 08	2, 505, 943. 04	-----	35. 6
Colorado.....	651, 210. 04	651, 210. 04	-----	13. 4
Connecticut.....	687, 857. 65	684, 715. 77	3, 141. 88	9. 2
Delaware.....	203, 298. 40	203, 298. 40	-----	1. 9
Florida.....	1, 307, 477. 38	1, 129, 464. 32	178, 013. 06	13. 8
Georgia.....	1, 047, 709. 04	1, 047, 709. 04	-----	35. 3
Idaho.....	965, 953. 20	943, 374. 52	-----	13. 5
Illinois.....	6, 298, 412. 04	6, 298, 412. 04	-----	64. 2
Indiana.....	2, 548, 474. 57	2, 548, 474. 57	-----	49. 5
Iowa.....	1, 319, 843. 17	1, 247, 030. 00	-----	21. 6
Kansas.....	1, 930, 602. 57	1, 785, 748. 77	-----	18. 7
Kentucky.....	731, 168. 11	724, 814. 00	-----	17. 3
Louisiana.....	617, 871. 43	617, 871. 43	-----	17. 8
Maine.....	646, 816. 12	645, 444. 82	-----	13. 9
Maryland.....	390, 738. 31	386, 588. 31	-----	3. 6
Massachusetts.....	4, 475, 346. 95	4, 436, 270. 79	39, 076. 16	13. 7
Michigan.....	2, 722, 745. 00	2, 720, 595. 00	-----	35. 2
Minnesota.....	1, 880, 914. 07	1, 869, 617. 18	2, 500. 00	41. 9
Mississippi.....	638, 526. 86	638, 526. 86	-----	25. 4
Missouri.....	2, 946, 033. 18	2, 542, 530. 91	-----	38. 8
Montana.....	585, 139. 71	585, 139. 71	-----	17. 0
Nebraska.....	1, 569, 767. 55	1, 569, 767. 55	-----	20. 1
Nevada.....	411, 763. 76	411, 763. 76	-----	7. 0
New Hampshire.....	678, 365. 95	664, 365. 95	-----	15. 6
New Jersey.....	2, 846, 861. 99	2, 792, 728. 99	30, 000. 00	19. 9
New Mexico.....	843, 703. 69	843, 703. 69	-----	16. 0
New York.....	8, 006, 217. 60	7, 489, 785. 00	39, 000. 00	57. 7
North Carolina.....	962, 606. 47	961, 328. 18	-----	34. 4
North Dakota.....	454, 556. 75	427, 371. 39	27, 185. 36	13. 7
Ohio.....	4, 109, 684. 43	3, 625, 318. 43	-----	47. 2
Oklahoma.....	1, 664, 345. 07	1, 664, 345. 07	-----	32. 0
Oregon.....	874, 529. 63	863, 369. 98	-----	14. 6
Pennsylvania.....	2, 963, 101. 24	2, 905, 023. 58	-----	35. 8
Rhode Island.....	338, 974. 92	338, 974. 92	-----	5. 2
South Carolina.....	725, 672. 31	725, 267. 30	405. 01	30. 2
South Dakota.....	680, 060. 88	680, 060. 88	-----	21. 9
Tennessee.....	1, 140, 039. 95	1, 140, 039. 95	-----	14. 3
Texas.....	3, 146, 496. 84	3, 079, 890. 27	-----	49. 4
Utah.....	54, 015. 64	53, 422. 98	-----	2. 8
Vermont.....	455, 811. 48	433, 717. 27	5, 838. 96	12. 0
Virginia.....	1, 330, 699. 04	1, 142, 139. 89	-----	12. 1
Washington.....	786, 454. 90	786, 454. 90	-----	11. 7
West Virginia.....	950, 313. 53	925, 967. 79	-----	16. 2
Wisconsin.....	1, 870, 171. 39	1, 834, 767. 78	25, 898. 24	35. 2
Wyoming.....	922, 428. 60	885, 471. 78	-----	18. 3
District of Columbia.....	680, 633. 97	663, 650. 15	-----	2. 3
Total.....	76, 409, 641. 34	73, 613, 461. 62	404, 442. 88	1, 120. 6

² No projects of this class in Hawaii.

TABLE 19.—Total cost and mileage of Public Works highway projects under construction on June 30, 1934, and Federal funds allotted thereto, by States—Con.

PROJECTS ON SECONDARY OR FEEDER ROADS

State	Estimated total cost	Federal funds allotted		Mileage
		Public Works funds	Federal-aid funds	
Alabama.....	\$857,518.34	\$857,518.34	-----	59.7
Arizona.....	441,468.95	429,341.96	-----	36.0
Arkansas.....	948,842.90	948,842.90	-----	118.9
California.....	3,204,357.74	2,721,574.10	-----	154.9
Colorado.....	1,025,898.66	994,429.71	-----	94.0
Connecticut.....	664,915.58	659,120.00	-----	14.5
Delaware.....	181,790.00	181,790.00	-----	1.8
Florida.....	850,256.61	850,256.61	-----	45.6
Georgia.....	920,605.43	920,605.43	-----	77.3
Idaho.....	546,438.63	532,783.11	-----	71.1
Illinois.....	4,610,167.64	4,610,167.64	-----	268.3
Indiana.....	540,734.86	540,734.86	-----	69.2
Iowa.....	1,821,511.10	1,640,950.00	-----	214.0
Kansas.....	2,182,166.63	2,170,276.56	-----	146.6
Kentucky.....	1,391,976.64	1,390,591.40	-----	146.5
Louisiana.....	922,070.51	922,070.51	-----	42.9
Maine.....	347,893.22	261,598.53	-----	27.4
Maryland.....	577,528.60	563,602.60	-----	44.0
Massachusetts.....	469,741.41	469,741.41	-----	15.2
Michigan.....	2,798,900.00	2,798,900.00	-----	218.3
Minnesota.....	1,619,796.48	1,613,476.33	-----	190.1
Mississippi.....	801,275.41	801,275.41	-----	92.4
Missouri.....	2,307,941.20	2,307,941.20	-----	353.6
Montana.....	1,119,834.58	1,119,834.58	-----	125.0
Nebraska.....	1,834,682.07	1,728,953.58	-----	213.3
Nevada.....	307,468.71	307,468.71	-----	28.2
New Hampshire.....	435,560.52	394,736.67	-----	23.2
New Jersey.....	56,550.52	56,550.52	-----	.5
New Mexico.....	874,633.59	874,633.59	-----	240.3
New York.....	3,702,200.00	3,264,550.00	-----	87.8
North Carolina.....	1,119,390.77	1,081,106.83	-----	126.2
North Dakota.....	176,701.59	176,701.59	-----	22.5
Ohio.....	3,316,490.00	3,016,818.00	-----	142.5
Oklahoma.....	1,783,376.08	1,677,379.13	-----	194.4
Oregon.....	1,050,254.52	928,020.15	-----	55.7
Pennsylvania.....	6,821,281.19	6,735,617.79	-----	605.3
Rhode Island.....	412,465.02	412,465.02	-----	33.2
South Carolina.....	1,247,341.80	1,247,341.80	-----	144.0
South Dakota.....	427,523.09	427,523.09	-----	140.4
Tennessee.....	955,167.96	955,167.96	-----	74.3
Texas.....	3,984,158.53	3,667,285.48	-----	366.8
Utah.....	470,666.59	445,300.00	-----	51.3
Vermont.....	444,002.49	424,132.63	-----	36.0
Virginia.....	1,054,220.53	993,814.18	-----	108.5
Washington.....	653,151.30	653,151.30	-----	36.1
West Virginia.....	897,576.45	897,576.45	-----	50.0
Wisconsin.....	1,333,491.78	1,288,586.71	-----	95.3
Wyoming.....	626,347.56	611,181.00	-----	91.6
District of Columbia.....	750,914.71	750,914.71	-----	5.2
Hawaii.....	177,717.69	177,717.69	-----	4.9
Total.....	66,066,966.18	63,502,117.77	-----	5,604.8

Of the 1,718 miles in projects approved for construction on June 30, nearly 639 miles were located on the Federal-aid highway system outside of cities; 227 miles were made up of municipal extensions of the system; and 852 miles consisted of secondary or feeder roads. The distribution of these projects and other information concerning them are given in table 20.

TABLE 20.—*Total cost and mileage of Public Works highways approved for construction on June 30, 1934, and Federal funds allotted thereto, by States*

PROJECTS ON THE FEDERAL-AID SYSTEM OUTSIDE OF MUNICIPALITIES¹

State	Estimated total cost	Federal funds allotted		Mileage
		Public Works funds	Federal-aid funds	
Alabama.....	\$367,849.72	\$233,948.59	\$133,901.13	21.5
Arizona.....	96,740.98	96,740.98	.....	10.7
Arkansas.....	673,389.29	636,509.29	36,880.00	24.0
California.....	1,041,371.05	191,793.40	.....	15.9
Delaware.....	5,770.00	5,770.00	.....	.3
Florida.....	56,281.75	56,281.75	.....	.7
Georgia.....	517,218.84	517,218.84	.....	22.4
Idaho.....	13,782.82	13,782.82	.....	.....
Illinois.....	1,762,692.49	1,762,692.49	.....	13.3
Indiana.....	692,050.37	657,562.62	.....	13.2
Iowa.....	148,667.07	140,675.50	.....	9.0
Kansas.....	25,391.30	25,391.30	.....	.3
Kentucky.....	597,972.44	468,319.40	.....	16.5
Louisiana.....	42,623.98	42,623.98	.....	1.5
Maine.....	24,085.44	24,085.44	.....	.2
Maryland.....	461,850.00	461,850.00	.....	6.4
Michigan.....	602,366.00	602,366.00	.....	21.0
Minnesota.....	153,425.81	143,425.81	10,000.00	12.7
Mississippi.....	501,945.70	276,070.22	225,875.48	29.1
Missouri.....	252,033.50	252,033.50	.....	9.3
Montana.....	158,408.58	31,988.11	48,998.40	36.2
Nebraska.....	42,693.12	35,794.58	.....	9.7
Nevada.....	122,456.09	79,129.02	43,327.07	.....
New Jersey.....	63,503.88	63,503.88	.....	.6
New Mexico.....	41,901.88	41,901.88	.....	3.6
New York.....	974,097.80	146,997.80	49,000.00	8.4
North Carolina.....	859,555.64	493,815.98	356,922.36	52.9
North Dakota.....	706,685.76	473,289.70	233,396.06	138.2
Ohio.....	196,500.00	77,878.00	.....	5.0
Oklahoma.....	146,968.44	146,968.44	.....	3.1
Oregon.....	235,870.38	167,388.02	.....	1.4
Pennsylvania.....	630,347.36	477,382.67	.....	5.7
Rhode Island.....	8,732.36	8,732.36	.....	.....
South Carolina.....	144,097.11	144,097.11	.....	9.0
South Dakota.....	232,337.41	143,477.48	88,859.93	41.9
Tennessee.....	390,724.63	390,724.63	.....	24.2
Texas.....	410,924.29	328,563.97	.....	26.2
Utah.....	68,204.10	68,204.10	.....	.4
Vermont.....	3,998.46	3,998.46	.....	.....
Virginia.....	414,970.61	387,355.78	27,614.83	23.8
Washington.....	64,640.67	64,640.67	.....	1.4
West Virginia.....	34,029.42	34,029.42	.....	.7
Wisconsin.....	66,816.72	63,174.25	.....	1.4
Wyoming.....	83,169.89	67,031.52	.....	10.2
Hawaii.....	426,495.88	248,693.76	129,332.90	6.8
Total.....	14,565,639.03	10,797,903.52	1,384,108.16	638.8

¹ No projects of this class in this status in Colorado, Connecticut, Massachusetts, New Hampshire, and the District of Columbia.

TABLE 20.—*Total cost and mileage of Public Works highways approved for construction on June 30, 1934, and Federal funds allotted thereto, by States—Con.*PROJECTS ON EXTENSIONS OF THE FEDERAL-AID SYSTEM INTO AND THROUGH MUNICIPALITIES ²

State	Estimated total cost	Federal funds allotted		Mileage
		Public Works funds	Federal-aid funds	
Alabama.....	\$703,763.64	\$703,763.64	.....	18.4
Arizona.....	284,883.32	284,883.32	.....	2.0
Arkansas.....	513,563.12	487,403.12	\$26,160.00	5.8
California.....	797,671.66	586,972.69	.....	3.6
Colorado.....	164,710.53	150,989.02	.....	3.6
Connecticut.....	68,293.81	68,293.81	.....	.5
Delaware.....	139,750.00	139,750.00	.....	4.9
Georgia.....	250,709.42	250,709.42	.....	11.9
Illinois.....	1,033,873.00	1,033,873.00	.....	3.0
Indiana.....	1,419,950.27	1,419,950.27	.....	19.3
Iowa.....	267,956.32	254,524.50	.....	5.6
Kansas.....	13,156.36	13,156.36	.....	.1
Kentucky.....	509,741.79	460,899.41	.....	9.6
Louisiana.....	535,980.65	509,387.22	26,593.43	2.8
Maine.....	24,448.68	24,448.68	.....	.4
Massachusetts.....	250,293.28	250,293.28	.....	1.0
Michigan.....	414,075.00	414,075.00	.....	3.5
Minnesota.....	306,952.70	291,480.62	.....	4.8
Mississippi.....	302,596.74	302,596.74	.....	7.1
Missouri.....	372,497.64	329,298.82	.....	6.0
Montana.....	178,482.37	178,482.37	.....	9.1
Nebraska.....	98,955.75	98,955.75	.....	1.5
New Hampshire.....	50,553.20	42,274.05	8,279.15	.9
New Jersey.....	41,442.01	41,442.01	.....	.5
New Mexico.....	84,837.68	66,812.89	.....	3.2
New York.....	71,000.00	32,800.00	.....	.6
North Carolina.....	306,693.48	285,608.05	1,885.81	10.0
North Dakota.....	596,045.77	595,459.44	586.33	25.2
Ohio.....	310,650.00	248,288.37	.....	2.7
Oklahoma.....	196,978.40	196,978.40	.....	4.5
Oregon.....	145,761.63	145,261.52	.....	3.3
Pennsylvania.....	605,111.22	598,476.07	.....	6.2
Rhode Island.....	157,015.50	106,638.68	.....	1.0
South Carolina.....	251,062.11	251,062.11	.....	7.8
South Dakota.....	280,530.04	280,530.04	.....	9.0
Tennessee.....	415,580.88	415,580.88	.....	4.8
Texas.....	761,103.20	609,566.77	.....	9.0
Vermont.....	29,051.10	25,000.00	.....	.7
Virginia.....	342,648.65	338,503.96	.....	5.0
West Virginia.....	187,844.31	187,844.31	.....	2.2
Wisconsin.....	259,388.07	259,388.07	.....	3.1
Wyoming.....	45,961.52	45,380.40	.....	3.2
Total.....	13,791,564.82	13,027,083.06	63,504.72	227.4

² No projects of this class in this status in Florida, Idaho, Maryland, Nevada, Utah, Washington, District of Columbia, and Hawaii.

TABLE 20.—*Total cost and mileage of Public Works highways approved for construction on June 30, 1934, and Federal funds allotted thereto, by States—Con.*PROJECTS ON SECONDARY OR FEEDER ROADS ³

State	Estimated total cost	Federal funds allotted		Mileage
		Public Works funds	Federal-aid funds	
Alabama.....	\$960,759.52	\$960,759.52	-----	83.0
Arkansas.....	135,002.66	135,002.66	-----	9.3
California.....	185,735.56	151,579.17	-----	6.7
Colorado.....	139,684.71	80,000.00	-----	3.4
Delaware.....	72,547.50	72,547.50	-----	12.2
Florida.....	28,423.34	28,423.34	-----	3.6
Georgia.....	277,397.03	277,397.03	-----	25.2
Illinois.....	379,677.71	379,677.71	-----	10.3
Iowa.....	663,054.66	341,495.00	-----	58.9
Kansas.....	6,440.48	6,440.48	-----	1.7
Kentucky.....	52,875.49	30,000.00	-----	5.4
Louisiana.....	286,879.00	286,879.00	-----	11.5
Maryland.....	262,345.90	262,345.90	-----	17.0
Michigan.....	197,200.00	182,300.00	-----	2.7
Minnesota.....	5,000.00	5,000.00	-----	1.5
Mississippi.....	445,874.39	445,874.39	-----	40.0
Missouri.....	50,017.33	49,901.33	-----	5.1
Montana.....	26,572.33	26,572.33	-----	3.5
Nebraska.....	12,325.86	12,325.86	-----	.1
New Mexico.....	20,000.00	20,000.00	-----	3.0
North Carolina.....	105,352.55	80,200.00	-----	15.1
North Dakota.....	545,234.59	545,234.59	-----	165.0
Ohio.....	193,150.00	193,150.00	-----	2.5
Oklahoma.....	596,666.00	567,265.51	-----	73.8
Oregon.....	120,230.36	95,860.24	-----	11.1
Pennsylvania.....	252,768.17	252,768.17	-----	20.7
South Carolina.....	63,136.00	63,136.00	-----	8.7
South Dakota.....	410,634.58	410,634.58	-----	153.1
Tennessee.....	636,341.23	636,341.23	-----	48.8
Texas.....	203,289.06	117,416.66	-----	2.5
Utah.....	68,967.69	68,967.69	-----	5.9
Vermont.....	14,823.57	14,747.37	-----	.4
Virginia.....	160,251.99	160,251.99	-----	1.0
Washington.....	27,739.30	27,739.30	-----	3.9
West Virginia.....	140,139.29	127,232.93	-----	9.2
Wisconsin.....	148,404.19	148,404.19	-----	16.6
Wyoming.....	59,918.00	59,918.00	-----	9.6
Total.....	7,954,860.04	7,323,789.67	-----	852.0

³ No projects of this class in this status in Arizona, Connecticut, Idaho, Indiana, Maine, Massachusetts, Nevada, New Hampshire, New Jersey, New York, Rhode Island, District of Columbia, and Hawaii.

The classification of the mileage of Public Works highway projects by surface types is shown for each of the States and each class of project completed in table 21. Similar information concerning projects under construction at the end of the fiscal year is given in table 22, and for projects approved for construction at the close of the year in table 23.

TABLE 21.—*Mileage of Public Works highway projects completed, by types of construction, by States, June 30, 1934*PROJECTS ON THE FEDERAL-AID SYSTEM OUTSIDE OF MUNICIPALITIES¹

State	Graded and drained	Sand-clay		Gravel		Macadam		Low-cost bituminous mix	Bituminous macadam	Bituminous concrete	Portland cement concrete	Block	Bridges and approaches	Total	Number of grade separation structures (mileage shown with bridges)	
		Un-treated	Treated	Un-treated	Treated	Un-treated	Treated								Rail-road—high-way	High-way—high-way
Alabama.....	6.0			4.9	4.7			76.6		1.0	46.0		0.3	61.9	2	
Arizona.....	29.0			22.8	3.8						5.2		1.7	131.1	1	
Arkansas.....				32.5	13.0			5.1		53.7	18.4		1.1	9.5	4	
California.....	.6			90.9		15.7					4.3		1.5	142.5	2	3
Colorado.....													.8	96.0		
Connecticut.....													.1			
Delaware.....																
Florida.....	3.3						23.1				3.0			3.0		
Georgia.....	9.9			4.9	14.2		12.7				17.2		.1	43.7		
Idaho.....				44.0				37.1		.4	31.8		.1	73.6	1	
Illinois.....	.7												.2	81.8	1	
Iowa.....	22.3			25.8							1		.1	9	2	
Kansas.....	139.0	47.2		15.6							26.1		.3	74.5	1	
Kentucky.....				37.8							2.7	1.6	.4	206.5		
Louisiana.....								7.8			14.0			59.6		
Massachusetts.....								.5	4.1		9.2			9.7		
Michigan.....											2.3			6.4	1	
Minnesota.....	41.4			357.2	15.6	13.2		60.0			1.8			1.8		
Mississippi.....	6.1										21.9		.2	509.5	6	
Missouri.....				5.2							6.6		.1	12.8		
Montana.....				81.7				10.5			38.2		.1	43.5		
Nebraska.....	29.7	100.8						43.4					1.2	93.4	6	
Nevada.....				89.5				83.4			41.6		.3	215.8		
New Hampshire.....													.1	173.0	1	
New Jersey.....													.3			
New Mexico.....				18.9	84.3			94.8			6.1			6.1		
New York.....	4									11.3			1.2	210.5		
North Carolina.....	2.5	15.0	22.1							.1	7.5			8.0		
North Dakota.....	146.1			311.4	24.5	10.4	7.1	10.6		.9	10.1		.3	103.5	1	
Ohio.....	1.8												.4	457.9	2	
Oklahoma.....	82.3									3.1	17.5	3.6	1.8	27.8		
Oregon.....	8.1			16.9			5.5		61.1		12.7	4.9	.7	101.4		
										1.6	4.6		1.1	98.9		

¹ No projects of this class completed in Indiana, Maine, Maryland, and the District of Columbia

TABLE 21.—*Mileage of Public Works highway projects completed, by types of construction, by States, June 30, 1934—Continued*

PROJECTS ON THE FEDERAL-AID SYSTEM OUTSIDE OF MUNICIPALITIES—Continued

State	Graded and drained	Sand-clay		Gravel		Macadam		Low-cost bituminous mix	Bituminous macadam	Bituminous concrete	Portland cement concrete	Block	Bridges and approaches	Total	Number of grade separation structures (mileage shown with bridges)	
		Un-treated	Treated	Un-treated	Treated	Un-treated	Treated								Rail-road—high-way	High-way
Pennsylvania.....	0.1										4.2		0.1	4.4		
Rhode Island.....									0.5		.6			1.1		
South Carolina.....	75.8	19.9						21.9		3.9			.5	24.3		1
South Dakota.....	10.3			76.9				5.1		10.0			.3	184.9		
Tennessee.....	392.7							11.3		46.0			.1	61.5		1
Texas.....				66.4	21.3			108.9		44.6		2.1		542.4		3
Utah.....				8.6				3.2	2.2	28.0			.5	146.0		
Vermont.....														7.4		
Virginia.....	5.4	5.6	2.4			6.0	9.3	.5		10.7			.5	40.2		3
Washington.....	6.6			27.9						9.0			.7	44.7		2
West Virginia.....				.3						6.3			.1	6.7		
Wisconsin.....								8.1		41.9				50.0		
Wyoming.....				119.4				58.3					.2	177.9		
Hawaii.....									6.3					6.3		
Total.....	1, 018.3	168.6	44.4	1, 462.8	183.4	29.6	73.4	649.1	74.2	74.0	554.2	12.2	18.6	4, 362.8	41	3

PROJECTS ON EXTENSIONS OF THE FEDERAL-AID SYSTEM INTO AND THROUGH MUNICIPALITIES 2

Alabama.....	0.5										2.5		0.1	3.1		1
Arizona.....								2.1		1.4				4.0		
Arkansas.....										2.1				7.0		
California.....					0.2			.7		6.3			.4	13.8		4
Colorado.....				1.4					0.3	5.3			.1	17.2		1
Connecticut.....										.5				.5		
Delaware.....										.2				.8		
Florida.....							1.2									
Georgia.....	.5									2.3			.1	3.6		1
Idaho.....				.4	1.1					9.7				12.4		
Illinois.....				1.2				1.7		1.7				4.8		
Indiana.....										3.1		0.6		3.7		
										1.2				1.2		

Iowa.....	3.1	1.4							19.0	.1	23.6	2
Kansas.....	5.3	.2			.5			.9	1.3		18.5	1
Kentucky.....											3.2	
Louisiana.....											6.4	
Maine.....								.7			1.6	
Massachusetts.....											2.4	
Michigan.....											1.8	
Minnesota.....	7.0	28.3	3.3	0.8	1.6			2.2		.1	2.3	
Mississippi.....	2.4							3.5		.1	53.6	3
Missouri.....		1	.4					1.4			3.8	
Montana.....	.7	2.1			5.5			.4		.1	12.7	
Nebraska.....	2.5	2.7								.1	9.2	4
Nevada.....									1.0		11.7	
New Jersey.....											1.2	
New Mexico.....	.4								.7		2.1	
New York.....	.4	1.1	1.9		2.8			1.3		.2	13.1	1
North Carolina.....	4.7			.5	2.7			1.8			1.4	
North Dakota.....								10.0			1.8	
Ohio.....		3.5						6			4.0	1
Oklahoma.....	3.1	.3						3.2			9.3	
Oregon.....	.3	.6						1.0			2.9	
Pennsylvania.....								3.3			7.9	
Rhode Island.....								4.0		.1	9.8	
South Carolina.....								10.4		.1	16.9	
South Dakota.....											1.2	
Tennessee.....	2.4							.9		.1	4.1	2
Texas.....	2.2							5.2			8.1	
Utah.....	14.0	6.9	9.1		1.2			4.4			6.7	
Vermont.....								9.1	1.6	.3	56.4	2
Virginia.....								13.6		.3	13.9	1
Washington.....								7			1.9	
West Virginia.....								3.6	.6		10.9	1
Wisconsin.....	.1	1.4						2.7		.5	20.7	
Wyoming.....		.1						2.5			1.9	
District of Columbia.....								1.0			13.5	
								.2			1.6	
								1.1			2.4	
Total.....	47.6	7.9	3.9	2.4	21.3	5.4	77.4	213.9	9.2	3.1	468.8	22

PROJECTS ON SECONDARY OR FEEDER ROADS³

Alabama.....										0.1	0.1	
Arizona.....	6.0									.3	6.3	1
Arkansas.....											15.9	
California.....		15.7						0.2			16.0	
Colorado.....										.3	82.2	
Florida.....		82.1								.1	26.0	
Georgia.....								.8			4.2	
Idaho.....		67.9						4.2		.1	70.8	

² No projects of this class completed in Maryland, New Hampshire, and Hawaii.³ No projects of this class completed in Connecticut, Delaware, Indiana, Massachusetts, Mississippi, New Jersey, Rhode Island, Vermont, and Hawaii.

TABLE 21.—*Mileage of Public Works highway projects completed, by types of construction, by States, June 30, 1934—Continued*

PROJECTS ON SECONDARY OR FEEDER ROADS—Continued

State	Graded and drained	Sand-clay		Gravel		Macadam		Low-cost bituminous mix	Bituminous macadam	Bituminous concrete	Portland cement concrete	Block	Bridges and approaches	Total	Number of grade separation structures (mileage shown with bridges)
		Un-treated	Treated	Un-treated	Treated	Un-treated	Treated								
Illinois														42.0	2
Iowa	8.1			41.7							0.6		0.3	49.2	
Kansas	14.6			40.3						1.7			.2	17.2	
Kentucky	27.1	0.9		35.6						6.3				69.0	
Louisiana										2.4				2.4	
Maine				54.3							0.2			54.5	
Maryland								1.0						1.9	
Michigan								0.9						7.3	
Minnesota	47.1			7.3										81.8	
Missouri	135.1			34.6									.1	3	
Montana				6.4				2.4					.3	141.8	
Nebraska	19.5	50.7		95.0									.2	97.6	
Nevada								14.9					.1	70.3	
New Hampshire				55.7										70.6	
New Mexico	7.5				1.0								.1	2.5	
New York				54.5				1.4					.1	62.1	
North Carolina		13.8		27.7	7.2			6.2		3.5	2.0		.1	11.8	
North Dakota	1.4							2.2					.3	51.2	
Ohio	2.2		2.3	85.7	2.9	66.1								1.4	
Oklahoma											.2	.5		159.9	
Oregon	.8			9.9	19.6			10.9		2.9			.5	2.9	
Pennsylvania				2.9	2.9			18.8		.4				41.7	1
South Carolina		.6	.9											30.0	
South Dakota	22.0			51.2									.1	1.6	
Tennessee	.4													73.2	
Texas	163.0			61.4	73.9	9.1		4.6	13.0	2.4	8.9			29.3	
Utah	2.3			97.0				5.1	12.5	80.4	2.5		1.0	408.9	1
Virginia		23.9	26.5	38.5		4.0		7.0	3.8		1.0			107.3	1
Washington				18.9									.2	96.9	1
West Virginia	8.6			3									.1	27.6	
Wisconsin				46.7							.3		.1	.7	
Wyoming				51.2				5.3			12.0		.1	58.8	
District of Columbia										2.1	.5		.1	56.6	
Total	465.7	89.9	29.7	1,079.6	115.1	79.2	16.7	78.1	59.0	91.9	43.6	.7	4.9	2,154.1	7

TABLE 22.—*Mileage of Public Works highway projects under construction, by types of construction, by States, June 30, 1934*PROJECTS ON THE FEDERAL-AID SYSTEM OUTSIDE OF MUNICIPALITIES¹

State	Graded and drained	Sand-clay		Gravel		Macadam		Low-cost bituminous mix	Bituminous macadam	Bituminous concrete	Portland cement concrete	Block	Bridges and approaches	Total	Number of grade separation structures (mileage shown with bridges)	
		Un-treated	Treated	Un-treated	Treated	Un-treated	Treated								Rail-road—high-way	High-way—high-way
Alabama.....	4.0		28.0	7.6	61.3			116.7		30.0	23.8		0.9	272.3	2	
Arizona.....	23.0			61.2				67.5			.6		.9	153.2	1	
Arkansas.....	9.0			77.8	5.3					11.6	31.5		1.8	137.0	2	
California.....	18.2			17.1	3.6			46.8	8.8	49.3	8.1		1.2	153.1	3	
Colorado.....	6.4			46.7							1.0		.8	54.9	4	
Connecticut.....				3.8				23.9			2.9		.1	30.7		
Delaware.....	5.3										9.3		.1	14.7		
Florida.....	16.5					12.4		31.0			11.8		.6	72.3	1	
Georgia.....	10.7	0.1	41.9	22.7	48.1	21.8		20.2		5.0	5.7		1.3	177.5	1	
Idaho.....	7.5			41.7				38.6		.1	5.3		.9	93.5		
Illinois.....	2.3										36.1	1.8	4.9	43.1	19	
Indiana.....	16.9										100.4		2.0	119.5	3	
Iowa.....	80.7									.2			2.5	185.6	8	
Kansas.....	126.2	9.5		5.4							46.1	2.2	1.7	191.1	1	
Kentucky.....	57.2			30.3				36.4	.8	11.6	40.8		.8	177.9		
Louisiana.....	10.3			2.2	7.5						45.9		1.6	67.5		
Maine.....					14.0			21.7		5.9	1.9		.5	44.0		
Maryland.....											9.6		.1	14.9		
Massachusetts.....								22.5		1.6	5.2		.6	31.4	1	
Michigan.....	33.8			88.5						3.5	117.4		.2	237.7	3	
Minnesota.....	66.0			70.2	10.4	50.4		40.3			2		3.6	235.2	3	
Mississippi.....	125.9			17.6	21.2						52.3		1.0	148.6	3	
Missouri.....	11.2			23.6						9.7	104.1		.8	270.5	5	1
Montana.....	30.6			161.0				68.8			9.3		1.2	137.1	2	
Nebraska.....	59.8	.6						20.3			54.4	.8	.1	87.1	2	
Nevada.....				12.3				74.1		.6			.5	10.5	1	
New Hampshire.....					3.1	.7			2.5		3.1		.1	36.4	1	
New Jersey.....	.2										36.1		.3	60.1		
New Mexico.....					32.6			11.9		15.3			.9	230.0	8	
New York.....	25.4			2.4				.1	5.5	43.4	152.3		.5	465.1		
North Carolina.....	6.4	56.9	178.7	28.7	67.0	30.8		18.2		12.7	1.0					
North Dakota.....	262.5			82.6				59.5						404.6		

¹ No projects of this class under construction in the District of Columbia.

TABLE 22.—*Mileage of Public Works highway projects under construction, by types of construction, by States, June 30, 1934—Continued*

PROJECTS ON THE FEDERAL-AID SYSTEM OUTSIDE OF MUNICIPALITIES—Continued

State	Graded and drained	Sand-clay		Gravel		Macadam		Low-cost bituminous mix	Bituminous macadam	Bituminous concrete	Portland cement concrete	Block	Bridges and approaches	Total	Number of grade separation structures (mileage shown with bridges)	
		Un-treated	Treated	Un-treated	Treated	Un-treated	Treated								Rail-road—high-way	High-way—high-way
Ohio.....	1.1			9.8		0.5		3.7	8.3	26.1	92.6	15.5	1.5	159.1		
Oklahoma.....	87.3			28.0	30.9					26.0	22.2		1.9	196.3		2
Oregon.....	12.3			2.6	7.2	0.1		.4	47.7	7.6	3.0		.3	83.2		
Pennsylvania.....	9.4								20.5	17.3	73.8		1.0	122.0	1	1
Rhode Island.....									7.9	1.9				19.4		
South Carolina.....	22.6		150.4					5.3	3.1		4.6		.3	186.3	5	
South Dakota.....	123.7			.7				109.6	1.2	11.7	52.0		.1	250.2		
Tennessee.....	37.6					8.0				41.8	47.7		1.5	104.0	2	
Texas.....	243.2			51.3	60.9					8.4			4.6	457.5	7	
Utah.....				24.3				11.6					.1	48.8		
Vermont.....				6.0				23.3	.5		7.4		.2	37.4		
Virginia.....	4.5	1.1	18.1			11.2	36.6			4.2	4.4		1.3	81.4	5	
Washington.....	13.0			19.7						28.0			.2	60.9	3	
West Virginia.....	23.6					10.0				.1	30.8		.2	64.9	2	
Wisconsin.....	8.8			37.5				29.0		28.1	70.2		.7	174.3	5	1
Wyoming.....	17.3							255.5					.1	272.9		
Hawaii.....									26.3				.2	26.5		
Total.....	1,620.4	68.2	431.7	983.3	373.1	92.5	154.6	1,088.4	201.2	383.9	1,485.0	20.3	46.4	6,949.0	106	3

PROJECTS ON EXTENSIONS OF THE FEDERAL-AID SYSTEM INTO AND THROUGH MUNICIPALITIES 2

Alabama.....			4.8		3.3		0.2	15.3		4.5	9.1	0.8		38.0	1	
Arizona.....								1.8	0.6	2.5	2.4			7.3		
Arkansas.....			.6	1.9	2.0			1.0		4.5	17.8		0.4	28.4	1	
California.....	0.2							.4	3	26.4	8.3		.2	35.6		3
Colorado.....				.5			1.1	1.5	2.8	4.0	3.5			13.4		
Connecticut.....									.5	5.0	2.7			9.2		
Delaware.....										.8	1.0		.1	1.9		
Florida.....	1.3						.6				11.7		.2	13.8	2	
Georgia.....	2.0		3.9	3.2	7.8	13.0		1.1			3.5	.3	.5	35.3	3	

Idaho.....							3.4				4.8				3.2	1.9	6.8	.2	13.5	3
Illinois.....															17.0	39.3	6.8	1.1	64.2	12
Indiana.....											1.5				23.6	23.6		.5	49.5	1
Iowa.....																14.5	4.4	1.5	21.6	7
Kansas.....																9.0	2.7	.5	18.7	2
Kentucky.....											4.5				4.1	6.8		.2	17.3	
Louisiana.....																5.0			17.8	
Maine.....															2.5	2.8			13.9	
Maryland.....															3.1	3.5			3.6	
Massachusetts.....															3.3	3.2	.7	2.2	13.7	1
Michigan.....															8.3	25.2		.4	35.2	4
Minnesota.....											2.2				3.2	11.4		.6	41.9	4
Mississippi.....															2.4	6.4	1.2	.1	25.4	3
Missouri.....															7.5	22.5		.9	38.8	5
Montana.....															4.9	2.0		.1	17.0	
Nebraska.....															2.4	12.2	1.9	.2	20.1	1
Nevada.....											1.9				5.1				7.0	
New Hampshire.....															1.4	13.2			15.6	
New Jersey.....															2.0	3.2		.3	16.0	2
New Mexico.....											4.3				14.7	35.0	.8	.8	57.7	1
New York.....															8.7	5.8		.2	34.4	5
North Carolina.....											1.7				2.0	4.0		.1	13.7	2
North Dakota.....											2.3				12.9	16.7	15.2	.5	47.2	1
Ohio.....															10.7	20.0		.1	32.0	
Oklahoma.....															2.0	7.0		.1	14.6	1
Oregon.....															8.1	23.5	2.6	.6	35.8	1
Pennsylvania.....															1.7	1.1			5.2	
Rhode Island.....															4.4	5.3			30.2	
South Carolina.....											4.7				4.6	7.9	1.1	.6	21.9	2
Tennessee.....											6.7				10.5	14.9		1.0	49.4	1
Texas.....															1.7	1.1		.1	2.8	13
Utah.....															2.7	6.9		.1	12.0	
Vermont.....											.5				2.3			.9	12.1	3
Virginia.....															1.9	6.1		.1	11.7	2
Washington.....															4.2	8.7		.4	16.2	1
West Virginia.....															5.0	20.1		1.3	35.2	2
Wisconsin.....											2.1					3.4		.1	18.3	
Wyoming.....											6.3				1.5	.7		.1	2.3	
District of Columbia.....																				
Total.....	71.6	4.6	36.0	40.7	38.1	4.3	27.6	79.5	34.8	248.5	479.0	38.5	17.4	1,120.6	92	26				

* No projects of this class under construction in and Hawaii.

TABLE 22.—*Mileage of Public Works highway projects under construction, by types of construction, by States, June 30, 1934—Continued*

PROJECTS ON SECONDARY OR FEEDER ROADS

State	Graded and drained	Sand-clay		Gravel		Macadam		Low-cost bituminous mix	Bituminous macadam	Bituminous concrete	Port-land cement concrete	Block	Bridges and approaches	Total	Number of grade separation structures (mileage shown with bridges)	
		Un-treated	Treated	Un-treated	Treated	Un-treated	Treated								Rail-road-way	High-way-high-way
Alabama.....	4.8	7.9	12.8	12.4	20.9			0.4					0.5	59.7		
Arizona.....				.8				35.0						36.0		
Arkansas.....				116.8	1.4									118.9		
California.....	25.4			18.9	4.1			87.2		18.0			1.3	154.9		
Colorado.....	3.1			88.8	1.9								.2	94.0		
Connecticut.....									14.5					14.5		
Delaware.....										.9	0.9			1.8		
Florida.....	23.8		4.8				16.7						.3	45.6		
Georgia.....	6.5			42.2	19.3		4.1	4.6					.6	77.3	1	
Idaho.....	6.0			51.2				13.9						71.1		
Illinois.....	18.0			213.9				5.3				3.6	3.2	268.3	9	
Indiana.....				28.1	37.8								.2	69.2		
Iowa.....	173.6			25.0				5.1					.8	214.0	2	
Kansas.....	133.2			5.2									.8	146.6	1	
Kentucky.....	76.2			61.1					3.0	3.0	5.9		.3	146.5		
Louisiana.....	1.2			6.4	14.6								.6	42.9	1	
Maine.....				25.9	1.0								.5	27.4		
Maryland.....	1.4		2.0	9.6	1.7		10.0	3.1	14.1	1.3	.8			44.0		
Massachusetts.....								3.7	11.5					15.2		
Michigan.....	14.4			166.5				4		19.0	17.7		.3	218.3		
Minnesota.....	164.0			26.7				4.0			5.1		.3	190.1		
Mississippi.....	55.8			30.8	5.0								.8	92.4		
Missouri.....	274.4			75.4				.9			1.2		1.7	353.6	3	
Montana.....	.3			107.3				16.1			1.1		.2	125.0		
Nebraska.....	136.4			64.9				3.9			7.2		.9	213.3		
Nevada.....				27.8					.5					28.2	1	
New Hampshire.....				.7			22.0							23.2		
New Jersey.....											.5			240.3		
New Mexico.....		33.0		207.3												
New York.....	.2			10.7						15.0	61.5		.4	87.8		
North Carolina.....		36.5	41.2	3.2	18.9			11.6					.3	136.2		
North Dakota.....	4.9			16.8						.8				22.5		
Ohio.....				81.5		3.9	.4	14.9		18.6	17.6	4.6	1.0	142.5	1	

TABLE 23.—*Mileage of Public Works highway projects approved for construction, by types of construction, by States, June 30, 1934*

PROJECTS ON THE FEDERAL-AID SYSTEM OUTSIDE OF MUNICIPALITIES¹

	22.5		122.5	13.7		23.3	34.5		194.4	1
Oklahoma.....			12.2			23.3			1.2	
Oregon.....			12.7	4.0		202.0	2.4		1.1	
Pennsylvania.....			72.3	33.2		308.7	8.1	13.9	605.3	1
Rhode Island.....			33.2	3.6					33.2	
South Carolina.....	9.7	3.2	127.4						144.0	
South Dakota.....	73.3		67.0						140.4	
Tennessee.....	34.8								74.3	
Texas.....	247.1		66.3	46.1	4.1	29.1	9.9	.2	366.8	5
Utah.....	6.2		41.7				1.6	1.8	51.3	
Vermont.....			8.5			26.1			36.0	1
Virginia.....		22.3	19.0	6.8	10.6	31.5			108.5	
Washington.....			29.9	11.1		3.4	1.0	1.7	36.1	1
West Virginia.....			8.4		1.0	1.7			50.0	
Wisconsin.....			28.7		38.8	39.5		26.4	95.3	
Wyoming.....			90.1			1.3			91.6	
District of Columbia.....								5.2		
Hawaii.....						4.9			4.9	
Total.....	1,507.6	167.8	207.2	1,943.6	310.6	23.6	323.5	308.5	413.0	28
								8.2	23.4	
									5,604.8	

State	Graded and drained	Sand-clay		Gravel		Macadam		Low-cost bituminous mix	Bituminous macadam	Bituminous concrete	Portland cement concrete	Block	Bridges and approaches	Total	Number of grade separation structures (mileage shown with bridges)	
		Un-treated	Treated	Un-treated	Treated	Un-treated	Treated								Rail-road—high-way	High-way
Alabama.....	9.4													21.5		
Arizona.....			1.7	9.0				1.1					0.3	10.7		
Arkansas.....				6.9				10.7						24.0		
California.....				3.0					14.0	2.2			.9	15.9		
Delaware.....								3.5	5.4	.3			.2			
Florida.....														.3		
Georgia.....		4.0													1	
Illinois.....	2.2						11.1		3.8	3.4			.7	22.4	1	
Indiana.....									10.2	9.9			.1	13.3		
Iowa.....									.9	12.0			.3	13.2	2	
								5.0		4.0				9.0		

¹ No projects of this class in this status in Colorado, Connecticut, Idaho, Massachusetts, Nevada, New Hampshire, Rhode Island, Vermont, and the District of Columbia.

TABLE 23.—*Mileage of Public Works highway projects approved for construction, by types of construction, by States, June 30, 1934—Contd.*
 PROJECTS ON THE FEDERAL-AID SYSTEM OUTSIDE OF MUNICIPALITIES¹

State	Graded and drained	Sand-clay		Gravel		Macadam		Low-cost bituminous mix	Bituminous macadam	Bituminous concrete	Portland cement concrete	Block	Bridges and approaches	Total	Number of grade separation structures (mileage shown with bridges)	
		Un-treated	Treated	Un-treated	Treated	Un-treated	Treated								Rail-road-way	High-way
Kansas				0.3				5.2			8.4		0.3	0.3	2	
Kentucky	2.4			.2										16.5	1	
Louisiana		0.7		.8									.2	1.5		
Maine														6.4		
Maryland	3.3									3.1				21.0	3	
Michigan	7.4			2					6.0	7.2			.2	12.7	1	
Minnesota				5.7				7.0		2.0			.2	29.1	1	
Mississippi	20.8	6.1								7.5			.1	9.3	3	
Missouri				1.7				25.0						36.2		
Montana				11.1				7.3						9.7		
Nebraska	2.4									.6				6	1	
New Jersey														8.6		
New Mexico				3.6						6.8				8.4		1
New York	1.6							11.6		.2			.2	52.9		
North Carolina	4.7	9.4	.8	11.9	14.1			30.2					.1	138.2	1	
North Dakota	66.7			41.2					1.2			0.2	.1	5.0		
Ohio				3.5										3.1	2	
Oklahoma				.1				3.0			1.4			1.4	2	
Oregon									4.0	.1	1.1		.5	5.7	2	
Pennsylvania										4.2			.1	9.0		
South Carolina			4.7							.5				41.9		
South Dakota	20.6							20.7			1.2			24.2		
Tennessee	17.2				.5				5.8		.2		.4	26.2	1	
Texas	11.5								13.6					4		
Utah				.3										26.2	1	
Virginia		.7	8.2			4.6	5.2	5.0					.1	4		
Washington				1.3									.1	23.8	4	
West Virginia				.2						.5			.1	1.4	1	
Wisconsin										1.3			.1	7		
Wyoming								10.2						10.2		
Hawaii									6.8					6.8		
Total	170.2	10.1	25.2	101.0	14.6	4.6	16.3	145.5	16.2	49.2	78.3	.2	6.4	638.8	40	2

PROJECTS ON EXTENSIONS OF THE FEDERAL-AID SYSTEM INTO AND THROUGH MUNICIPALITIES ²

Alabama.....	2.0		2.1		2.6	1.4	3.3		2.1	4.8	0.1	18.4	1
Arizona.....							.5			1.2		2.0	3
Arkansas.....				0.1					1.2	4.2		5.8	2
California.....							1.4		2.0		.2	3.6	
Colorado.....							.5		1.7	1.4		3.6	
Connecticut.....									.5			.5	
Delaware.....									1.0	3.9		4.9	
Georgia.....			.5	2.0	.1	7.3			.8	1.2		11.9	1
Illinois.....										2.9	.1	3.0	6
Indiana.....							.9		7.6	11.5	.2	19.3	
Iowa.....	2.3									2.2	.2	5.6	
Kansas.....										1		.1	
Kentucky.....	.6						1.0		.6	7.4		9.6	
Louisiana.....	.7									1.9	.2	2.8	
Maine.....							0.4					.4	
Massachusetts.....										1.0		1.0	
Michigan.....									2.4	1.0	.1	3.5	
Minnesota.....				.1			.9		1.5	1.0		4.8	3
Mississippi.....	3.5				1.3				1.0	1.2		7.1	
Missouri.....	.3			3					2.8	2.4	.2	6.0	2
Montana.....				2.7			5.6		.4			9.1	
Nebraska.....	.2									1.3		1.5	
New Hampshire.....										.9		.9	
New Jersey.....										.5		.5	
New Mexico.....					.6		2.5				.1	3.2	
New York.....										.6		.6	
North Carolina.....	.1		0.8	1.5	.5	3.0	19.4		2.3	1.9		10.0	
North Dakota.....				1.3					.6	3.1	.7	25.2	
Ohio.....									.3	.7	.1	2.7	1
Oklahoma.....	.5				.4				2.0	1.5		4.5	
Oregon.....							1.2		3.7	2.1	.2	3.3	1
Pennsylvania.....							.1			1.5	.7	6.2	
Rhode Island.....									1.0			1.0	
South Carolina.....			1.7						1.7	4.4		7.8	
South Dakota.....							.7			8.3		9.0	
Tennessee.....									2.1	2.6	.1	4.8	1
Texas.....	2.0				3.3	.1			2.6	.4	.4	9.0	4
Vermont.....										.7		.7	
Virginia.....					.7	3.0			1.1		.2	5.0	
West Virginia.....				.1	.4				1.0	.4	.3	2.2	1
Wisconsin.....									2.4	.7		3.1	
Wyoming.....							3.0			.2		3.2	
Total.....	12.2	.8	5.8	6.6	9.9	14.8	39.7	1.7	46.4	81.7	3.4	227.4	26

² No projects of this class in this status in Florida, Idaho, Maryland, Nevada, Utah, Washington, the District of Columbia, and Hawaii.

TABLE 23.—*Mileage of Public Works highway projects approved for construction, by types of construction, by States, June 30, 1934—Contd.*

PROJECTS ON SECONDARY OR FEEDER ROADS *

State	Graded and drained	Sand-clay		Gravel		Macadam		Low-cost bituminous mix	Bituminous macadam	Bituminous concrete	Port-land cement concrete	Block	Bridges and approaches	Total	Number of grade separation structures (mileage shown with bridges)	
		Un-treated	Treated	Un-treated	Treated	Un-treated	Treated								Rail-road—high-way	High-way
Alabama	7.5	13.7	9.3	26.0	2.6	9.9	0.8	12.3			0.6		0.3	83.0	2	
Arkansas				9.1									.2	9.3		
California	1.2							5.5						6.7		
Colorado				3.4										3.4		
Delaware				12.2										12.2		
Florida		3.5											.1	3.6	1	
Georgia													.2	25.2	2	
Illinois		7.6		12.4	5.0			6.4		3.9			.5	10.3		
Iowa	33.7							24.5		.2				58.9		
Kansas								1.7						1.7		
Kentucky								5.4						5.4		
Louisiana				1.0										11.5		
Maryland	10.2			7.8	1.0			4.0		4.2			.3	17.0		
Michigan				1.6						1.0				2.7		
Minnesota	1.5												.1	1.5		
Mississippi	26.2	4.7		8.6									.5	40.0		
Missouri				4.3				.3		0.5				5.1		
Montana				3.5										3.5		
Nebraska	.1													.1		
New Mexico		3.0												3.0		
North Carolina		3.9	11.2											15.1		
North Dakota	133.0			31.9									.1	165.0		
Ohio										1.4		1.1		2.5		
Oklahoma				51.3				6.2		15.2	.7			73.8		
Oregon				.5						.1				11.1		
Pennsylvania													.1	20.7		
South Carolina														8.7		
South Dakota	4.6	4.1					6.4	8.7						133.1		
Tennessee	33.2			119.9										48.8		
Texas	31.3			12.9				4.0					.6	2.5		
Utah	2.3												.2	5.9		
Vermont				5.9				.4						.4		

[illegible]

³ No projects of this class in this status in Arizona, Connecticut, Idaho, Indiana, Maine, Massachusetts, Nevada, New Hampshire, New Jersey, New York, Rhode Island, District of Columbia, and Hawaii.

It will be noted that the completed projects included 70 structures separating the grades of railroad and highways at intersections and 7 highway-highway grade-separation structures. In course of construction at the close of the year were 226 other railroad-highway grade-separation structures and 29 structures eliminating level intersections of highways. To these will be added the 71 railroad-highway and 2 highway-highway structures shown in table 23 as approved for construction to make up the total of 405 grade-crossing-eliminating structures included in the Public Works highway program up to the end of the year.

The number of projects of this character included in the program is evidence of the importance attributed to the elimination of accident hazards in preparing the program of work under the National Industrial Recovery Act. In addition to the grade crossings eliminated by structures many more have been avoided by relocation of the highways as part of the improvement to be made; and the ends of safety are also served by the widening of existing surfaces, the easing of curves and grades, the lengthening of sight distances, and other marked betterments which result from the improvements planned and in course of realization.

Other major objectives to which, subject always to the primary employment purpose, special effort has been directed, include the closing of the remaining unimproved gaps in the Federal-aid highway system; and the provision of road facilities to aid in the better coordination of transportation, especially roads to local railroad stations and roads that will be capable of taking over the service heretofore rendered by nonpaying railroad branch lines.

Prominent also among the special objects sought by the Public Works expenditure is the landscaping of a reasonable mileage of roadsides. To provide for the inclusion of a reasonable amount of work of this character it was required that at least 0.5 percent of each State's apportionment of the Public Works funds should be devoted to it. A minimum of nearly \$2,000,000 was thus assured for the pioneer work toward the ultimate elimination of unsightly roadside conditions, which, next to the provision of safe, convenient, and economical roadways, must be an object of all future road-improvement programs.

CONSTRUCTION OF ROADS THROUGH PUBLIC LANDS AND FEDERAL RESERVATIONS

Special appropriations for the survey, construction, reconstruction, and maintenance of main roads through unappropriated or unreserved public lands, non-taxable Indian lands, and other Federal reservations except national forests have been made by four Congressional acts passed up to the end of the fiscal year 1934.

As reported last year, the first two of these appropriations, aggregating \$5,000,000, were made by the Emergency Employment Act of December 20, 1930, and the Emergency Relief and Construction Act of 1932. To this sum the National Industrial Recovery Act added \$5,000,000, and the act approved June 19, 1934, \$2,500,000.

TABLE 24.—*Status of appropriations for roads through public lands and Federal reservations, June 30, 1934*

State	Total sum apportioned	Sums allotted to projects—					Unobligated balance
		Not yet under construction	Under construction	Completed and finally inspected	Completed and final payment made	Total allotted	
Arizona.....	\$1,456,479	\$123,344.82	\$522,508.71	\$190,205.82	\$620,376.38	\$1,456,435.73	\$43.27
California.....	891,893	205,000.00	546,847.35	22,713.90		774,561.25	117,331.75
Colorado.....	375,881	164,886.26	199,130.00			364,016.26	11,864.74
Idaho.....	543,486	12,125.39	265,590.00	101,200.93	164,569.68	543,486.00	
Montana.....	530,411		295,425.09	35,362.59	199,623.32	530,411.00	
Nevada.....	2,159,555	361,477.50	584,671.36	185,410.38	896,147.16	2,027,706.40	131,848.60
New Mexico.....	807,512		119,682.11	233,714.95	408,663.19	762,060.25	45,451.75
North Dakota.....	88,597	2,750.52	23,487.11	12,928.48	21,106.44	60,272.55	28,324.45
Oklahoma.....	104,733	62,200.12			41,460.41	103,660.43	1,072.57
Oregon.....	659,223	10,000.00	291,543.89	61,759.79	295,919.32	659,223.00	
South Dakota.....	198,725	132,794.43	65,715.00			198,509.43	215.57
Utah.....	1,100,495		534,823.61	22,136.95	543,534.44	1,100,495.00	
Washington.....	145,209		48,469.42	5,842.10	87,772.30	142,083.82	3,125.18
Wyoming.....	812,801	89,793.77		222,251.00	449,350.00	761,394.77	51,406.23
Total.....	9,875,000	1,164,372.71	3,497,893.65	1,093,526.89	3,728,522.64	9,484,315.89	390,684.11

Of the total of \$12,500,000 authorized only the first \$10,000,000 has been apportioned up to the close of the fiscal year. As deduction for administrative purposes was made from the first \$5,000,000 only, the amount apportioned for road construction was \$9,875,000. The States benefiting and the amounts of their apportionments are shown in table 24. The same table also shows the progress made toward expenditure of the funds in the several States.

RESTORATION OF FLOOD-DAMAGED ROADS

No addition has been made during the past year to the appropriations previously made for relief of States on account of damage to roads by floods.

Of the various appropriations those made to Vermont and New Hampshire and reported as expended in the last annual report are still the only ones completely expended. Of the appropriation to Kentucky nearly \$300,000 was paid during the year and the unobligated balance was reduced by about \$37,000.

There was no change in the status of the appropriations to Arkansas, Louisiana, Mississippi, Missouri, and Alabama; but with the exception of the last named these appropriations have no definite time of availability. Availability of the Alabama appropriation, extended to June 30, 1934, by the act of March 3, 1933, was further extended to June 30, 1935, by the Emergency Appropriation Act approved June 19, 1934.

Of the remaining appropriations—those to Georgia, South Carolina, and Florida—the first lapsed on June 30, 1934, with \$18,771.85 still unobligated, that to South Carolina was completely obligated and in course of expenditure by June 30, and that to Florida was unaltered in status since the previous year's report.

The status of these several appropriations on June 30, 1934, is shown in table 25.

TABLE 25.—*Flood relief appropriated, amounts paid to States, and the unobligated balance of the appropriation on June 30, 1934*

State	Appropriated	Paid to States	Unobligated balance
Vermont.....	\$2,654,000.00	\$2,654,000.00	-----
New Hampshire.....	653,300.00	653,300.00	-----
Kentucky.....	1,889,994.00	1,234,442.47	\$629,512.59
Total.....	5,197,294.00	4,541,742.47	629,512.59
Arkansas.....	1,800,000.00	1,477,693.56	322,306.44
Louisiana.....	967,582.00	786,271.13	181,310.87
Mississippi.....	628,000.00	345,266.57	282,733.43
Missouri.....	258,418.00	119,428.31	130,865.95
Total.....	3,654,000.00	2,728,659.57	917,216.69
Alabama.....	¹ 1,618,500.00	481,083.81	1,137,416.19
Georgia.....	¹ 505,167.50	464,351.67	² 18,771.85
South Carolina.....	¹ 801,361.00	782,362.18	-----
Florida.....	80,307.00	77,296.48	-----
Total.....	3,005,335.50	1,805,094.14	1,156,188.04
Grand total.....	11,856,629.50	9,075,496.18	2,702,917.32

¹ Does not include fund allowable for administration.

² Availability for obligation expired June 30, 1934.

The mileage of road improved under the flood-relief acts up to the end of the fiscal year and the corresponding total cost and Federal payment are given in table 26. Similar information for roads completed and paid for during the past year is presented in table 27; and for roads under construction and approved for construction in table 28.

TABLE 26.—*Total cost, flood relief, and mileage improved to June 30, 1934*

State	Total cost	Flood relief	Miles
Vermont.....	\$5,651,965.83	\$2,654,000.00	61.2
New Hampshire.....	1,408,479.45	653,300.00	29.1
Kentucky.....	2,951,767.56	1,213,483.95	209.2
Total.....	10,012,212.84	4,520,783.95	299.5
Arkansas.....	843,914.04	405,711.21	49.8
Mississippi.....	11,433.59	3,563.66	.3
Total.....	855,347.63	409,274.87	50.1
Alabama.....	319,797.49	155,615.15	41.7
Georgia.....	417,306.53	202,008.56	5.1
South Carolina.....	1,392,434.71	637,421.98	18.5
Total.....	2,129,538.73	995,045.69	65.3
Grand total.....	12,997,099.20	5,925,104.51	414.9

TABLE 27.—*Total cost, flood relief, and mileage of roads which were completed and paid for during the fiscal year 1934*

State	Total cost	Flood relief	Miles
Kentucky.....	\$1,152,560.78	\$463,142.88	106.1
Georgia.....	32,792.16	14,573.70	.3
South Carolina.....	161,643.66	77,700.00	.3
Total.....	194,435.82	92,273.70	.6
Grand total.....	1,346,996.60	555,416.58	106.7

TABLE 28.—*Total cost, flood relief, and mileage of roads under construction and approved for construction on June 30, 1934*

State	Total cost	Flood relief	Miles
Georgia.....	\$70,249.18	\$31,178.18	0.8
Kentucky.....	93,994.93	46,997.46	10.2
South Carolina.....	366,521.23	163,939.02	3.9
Total.....	530,765.34	242,114.66	14.9

The mileage of the several surface types represented in flood-relief roads completed and fully paid for during the fiscal year 1934 is given in table 29, and the total mileages completed, and under construction or approved for construction at the close of the fiscal year are given in tables 30 and 31, respectively.

TABLE 29.—*Mileage of various types of flood-relief roads completed and paid for during the fiscal year 1934*

State	Graded and drained	Gravel, untreated	Portland cement concrete	Bridges and approaches	Total
Georgia.....			0.2	0.1	0.3
Kentucky.....	100.9	4.6		.6	106.1
South Carolina.....				.3	.3
Total.....	100.9	4.6	.2	1.0	106.7

TABLE 30.—*Mileage of the various types of flood-relief roads improved to June 30, 1934*

State	Graded and drained	Sand-clay, untreated	Gravel, untreated	Gravel, surface treated	Macadam, surface treated	Bituminous macadam	Portland cement concrete	Bridges and approaches	Total
Vermont.....			7.0	9.2		6.1	32.5	6.4	61.2
New Hampshire.....				2.9	4.9	2.3	18.4	.6	29.1
Kentucky.....	203.0		4.7					1.5	209.2
Total.....	203.0		11.7	12.1	4.9	8.4	50.9	8.5	299.5
Arkansas.....	16.1		31.1				.3	2.3	49.8
Mississippi.....							.3		.3
Total.....	16.1		31.1				.6	2.3	50.1
Alabama.....	17.4	15.9	7.6					.8	41.7
Georgia.....		.4			3.3		.6	.8	5.1
South Carolina.....	10.1						5.3	3.1	18.5
Total.....	27.5	16.3	7.6		3.3		5.9	4.7	65.3
Grand total.....	246.6	16.3	50.4	12.1	8.2	8.4	57.4	15.5	414.9

TABLE 31.—*Mileage of the various types of flood-relief roads under construction and approved for construction on June 30, 1934*

State	Graded and drained	Sand-clay, untreated	Gravel, untreated	Macadam, treated	Portland cement concrete	Bridges and approaches	Total
Georgia.....				0.3	0.4	0.1	0.8
Kentucky.....	1.4		8.7			.1	10.2
South Carolina.....	2.9	0.4				.6	3.9
Total.....	4.3	.4	8.7	.3	.4	.8	14.9

WORK-RELIEF HIGHWAY PROJECTS

In the early fall of 1933 relief needs were especially urgent in a number of Western and Southwestern States in which farm crops had been destroyed or greatly reduced as a result of severe drought and, in the Dakotas, by a scourge of grasshoppers.

Relief authorities were desirous of providing useful work that could be done by those in need of aid, so that the relief extended would have as much as possible of the character of a wage paid for services rendered and as little as might be of the aspect of a dole. It was felt that road work of a simple but needed and useful character could be provided, but the effort to do so was embarrassed by the fact that the relief funds were usable only for relief purposes and could not be employed to pay for road materials and equipment and other nonservice items which enter in some part into even the simplest of road improvements. This difficulty was overcome by effecting an arrangement under which the Public Works Administration granted amounts necessary to pay such nonservice costs, limited to not more than 30 percent of the total expenditure, and the Federal Emergency Relief Administration supplied from its relief rolls and paid the necessary workers.

Under this arrangement the Bureau of Public Roads, cooperating with the respective State highway departments, assumed the responsibility of supervising the road work.

Work of this sort has been carried on during the fiscal year in 9 States on nearly 7,500 miles of road. The number of projects in each State, the estimated cost and amount payable from Public Works funds, and the mileage of road involved are given in table 32.

TABLE 32.—*Number and estimated cost and mileage of National Recovery work-relief projects undertaken during the fiscal year 1934, and Public Works funds involved*

State	Projects	Estimated total cost	Public Works funds	Mileage
	<i>Number</i>			
Colorado.....	3	\$600,000.00	\$180,000.00	155.0
Florida.....	1	1,000,000.00	300,000.00	(1)
Kansas.....	18	2,096,277.71	628,883.31	542.9
New Mexico.....	6	970,000.00	291,000.00	654.0
North Dakota.....	42	2,998,450.00	899,535.00	1,587.1
Oklahoma.....	7	1,740,000.00	522,000.00	460.6
South Dakota.....	54	3,300,000.00	990,000.00	1,341.0
Texas.....	34	6,548,620.10	1,964,586.02	975.0
Wisconsin.....	44	2,960,477.00	883,727.40	1,784.2
Total.....	209	22,213,824.81	6,659,731.73	7,499.8

¹ Repairs to roads and bridges damaged by floods.

LOAN-AND-GRANT HIGHWAY PROJECTS

Under the provisions of section 203 of the National Industrial Recovery Act, the Public Works Administration, during the course of the year agreed to finance or aid in the financing of, by loans or grants or both, the construction of roads in a number of States. The road-building activity thus provided for was additional to all other projects initiated under the grants specifically authorized for highway construction by sections 204 and 205 of the act.

Late in the fiscal year, the detailed administration of this work was transferred to the Bureau of Public Roads by the Public Works Administration. The status of the work transferred is given in table 33.

TABLE 33.—Status on June 30, 1934 of loan-and-grant Public Works projects transferred by the Public Works Administration to the Bureau of Public Roads for supervision and audit

State	Funds allotted by Public Works Administration		Mileage, estimated cost, and funds assigned to specific projects approved under Public Works Administration allotments					
	Tentative allotment by Special Board for Public Works	Allotment by contracts executed		Miles	Estimated total cost	Funds assigned		
		Grant	Loan			Grant	Loan	Other
California.....	\$1,501,000	\$1,501,000.00		10.7	\$4,093,734.01	\$1,161,560.98		\$2,932,173.03
Connecticut.....	1,034,100	1,034,100.00		106.7	3,241,902.10	776,742.71		2,465,159.39
Illinois.....	88,500	84,000.00		2.9	225,241.66	67,572.51		157,669.15
Indiana.....	204,300	204,300.00		34.4	709,613.66	193,015.46		516,598.20
Iowa.....	406,400	380,100.00		142.8	75,610.74	22,683.21		52,927.53
Kansas.....	338,700	65,200.00		103.2	229,580.57	62,316.71		167,263.86
Maryland.....	5,411,866	1,411,866.00		40.2	3,185,161.38	955,548.44	\$2,229,612.94	
Massachusetts.....	1,574,500	1,574,500.00		86.5	4,675,767.61	1,381,857.94		3,293,909.67
Michigan.....	20,400	20,400.00						
Minnesota.....	627,500	209,000.00		210.8	653,382.93	180,553.65	287,294.29	185,534.99
Mississippi.....	531,000	131,000.00						
Missouri.....	1,805,000	1,805,000.00		1	18,041.92	3,450.00		14,561.92
Montana.....	1,648,758	398,758.00		496.1	1,076,002.73	250,733.73	788,990.17	36,278.83
Nebraska.....	11,500	11,500.00		59.5	38,376.20	10,755.89		27,620.31
New York.....	3,204,733	1,033,799.90		3.2	143,950.00	34,000.00		109,950.00
Ohio.....	90,000	90,000.00		6.5	316,739.00	83,587.70		233,151.30
Texas.....	306,300	198,800.00		67.7	787,294.88	228,266.37	71,050.08	487,978.43
Vermont.....	9,000	9,000.00						
Washington.....	249,550	246,550.00		152.7	906,152.05	236,890.29		669,261.76
West Virginia.....	5,114,500	1,216,500.00		31.3	505,004.13	121,201.00	383,803.13	
Wisconsin.....	437,500			138.1	365,677.50	109,703.25	255,974.25	
Total.....	24,615,107	11,625,373.90		1,693.4	21,247,233.07	5,880,469.84	4,016,724.86	11,350,038.37

NATIONAL-FOREST-ROAD CONSTRUCTION

As explained in previous annual reports, the appropriations made for improvement of roads in the national forests have hitherto recognized and provided separately for the improvement of two principal classes of road designated, respectively, forest highways and forest-development roads. The latter, as the name implies, serve primarily for the development of the forests, the former are roads of a higher order of traffic importance, generally those joining sections of the Federal-aid or State highway systems outside of the forests or important community-service roads, requiring improvement generally more expensive than that required on forest-development roads.

In the main, the work supervised by the Bureau of Public Roads is limited to the construction of forest highways; forest-development road work is generally administered by the Forest Service. But, while this definition of the work of the two Bureaus is approximately correct, the exact line of separation is drawn between what are termed major and minor projects. Major projects, administered by the Bureau of Public Roads, include all projects in the forest-highway system, except those which do not require the technical services of a highway-engineering organization or those having an estimated average cost of less than \$2,000 per mile. Those forest-development road projects of estimated average cost greater than \$5,000 per mile and those requiring technical services are also classed as major projects.

Departing from the previous practice, Congress, in the National Industrial Recovery Act, did not attempt to delimit the amounts to be allotted to each of these classes of roads, but provided for both in a single authorization for the expenditure of not less than \$50,000,000 for the construction of roads in several classes of Federally controlled areas including the national forests. Under this authorization the Public Works Administration allotted to forest highways \$10,000,000 and to forest-development roads \$5,000,000. Similar provision was made for continuance of the work in the Hayden-Cartwright Act which authorizes appropriation of \$24,000,000 for the various classes of road work. Of this amount the allotment for forest highways is \$7,000,000 and for forest-development roads \$3,000,000.

In accordance with requirements of the governing rules and regulations a system of forest highways has been designated by concurrent action of the several State highway departments, the Forest Service, and this Bureau, and approved by the Secretary of Agriculture. Also, as required by the rules and regulations, the highways constituting this system have been classified as follows:

Class 1. Forest roads forming sections of the Federal-aid highway system, either wholly within or, when so designated by the Forester and the Chief of the Bureau of Public Roads, partly without and adjacent to the national forests.

Class 2. Forest roads, not of class 1, which are parts of approved State highway systems, when so designated by the Forester and the Chief of the Bureau of Public Roads.

Class 3. All other forest roads, of primary importance to counties or communities.

The roads which, according to these definitions, had been classified as forest highways, had an aggregate length on June 30, 1934, of 16,963 miles, classified as shown in table 34.

TABLE 34.—*Classification of the mileage of the forest-highway system as revised to June 30, 1934*

State	Mileage of forest-highway system			
	Class 1	Class 2	Class 3	Total
Western:				
Alaska.....			484.87	484.87
Arizona.....	320.6	245.0	495.90	1,061.50
California.....	578.4	1,357.0	406.9	2,342.3
Colorado.....	508.0	1,113.0	104.0	1,725.0
Idaho.....	687.21	176.6	184.5	1,048.31
Montana.....	628.3	335.8	240.0	1,204.1
Nevada.....	104.0	190.6	165.3	459.9
New Mexico.....	164.0	518.0		682.0
Oregon.....	524.66	418.68	422.13	1,365.47
South Dakota.....	227.0		86.0	313.0
Utah.....	96.65	530.30	110.2	737.15
Washington.....	386.5	135.4	247.9	769.8
Wyoming.....	387.3	37.0	217.7	642.0
Total.....	4,612.62	5,057.38	3,165.40	12,835.40

TABLE 34.—*Classification of the mileage of the forest-highway system as revised to June 30, 1934—Continued*

State	Mileage of forest-highway system			
	Class 1	Class 2	Class 3	Total
Eastern:				
Alabama.....	4.0	-----	31.0	35.0
Arkansas.....	192.33	144.32	90.5	427.15
Florida.....	39.69	134.98	36.3	210.97
Georgia.....	41.8	37.5	68.7	148.0
Illinois.....	-----	-----	24.0	24.0
Kentucky.....	41.0	58.0	13.0	112.0
Louisiana.....	48.3	118.7	25.0	190.0
Maine.....	-----	-----	11.0	11.0
Michigan.....	49.91	108.5	150.3	308.71
Minnesota.....	89.50	-----	222.2	311.70
Mississippi.....	32.0	13.0	78.0	123.0
Nebraska.....	-----	-----	28.8	28.8
New Hampshire.....	41.5	60.5	49.0	151.0
North Carolina.....	102.0	105.3	48.3	255.6
Oklahoma.....	31.48	-----	70.5	101.98
Pennsylvania.....	134.0	248.0	25.0	407.0
Puerto Rico.....	-----	-----	21.0	21.0
South Carolina.....	-----	26.0	11.0	37.0
Tennessee.....	83.8	105.0	79.0	267.8
Vermont.....	7.0	-----	12.0	19.0
Virginia.....	79.0	117.9	210.0	406.9
West Virginia.....	76.0	102.0	62.0	240.0
Wisconsin.....	5.0	148.9	136.1	290.0
Total.....	1,098.31	1,528.60	1,500.70	4,127.61
Grand total.....	5,710.93	6,585.98	4,666.10	16,963.01

During the past year improvements were constructed on 938 miles of the forest-highway system, bringing the total mileage improved to date with Federal funds to 5,868 miles. Of the mileage improved during the year 877 miles were in the Western States and Alaska, and the remaining 61 miles were in the forests of 7 Eastern States. Of the total mileage improved to date 5,400 miles are in the West and 468 miles in the East.

The mileage of forest-highway projects constructed during the year and to date by States is shown in table 35.

TABLE 35.—*Mileage of completed forest-highway projects, by States*

State	Mileage of forest-highway projects completed		State	Mileage of forest-highway projects completed	
	During 1934	Total to June 30, 1934		During 1934	Total to June 30, 1934
Western:			Eastern:		
Alaska.....	6.4	235.7	Alabama.....	-----	5.1
Arizona.....	106.8	496.0	Arkansas.....	17.4	102.2
California.....	202.3	712.7	Florida.....	16.4	56.6
Colorado.....	106.5	486.5	Georgia.....	-----	21.4
Idaho.....	86.9	592.2	Michigan.....	5.9	36.4
Montana.....	52.0	533.0	Minnesota.....	13.9	107.4
Nevada.....	10.1	149.2	New Hampshire.....	5.1	13.2
New Mexico.....	62.9	282.6	North Carolina.....	1.3	46.4
Oregon.....	108.5	903.7	Pennsylvania.....	1.2	3.0
South Dakota.....	3.5	58.8	South Carolina.....	-----	15.6
Utah.....	21.3	318.8	Tennessee.....	-----	37.4
Washington.....	54.7	293.1	Virginia.....	-----	19.3
Wyoming.....	55.0	337.9	West Virginia.....	-----	3.6
Total.....	876.9	5,400.2	Total.....	61.2	467.6
			Grand total.....	938.1	5,867.8

On June 30, 1934, work was in progress under the supervision of the Bureau of Public Roads on 1,089 miles of road at a total estimated cost of \$12,207,568. Work estimated to cost \$2,020,021 had been planned but not yet started; and there was a balance of authorized funds not yet obligated to definite projects amounting to \$1,916,808.

ROAD CONSTRUCTION IN NATIONAL PARKS

During the fiscal year 1934 construction was completed on a total of 157 miles of roads in the national parks, making a total of 831 miles thus far improved. Under the agreement of several years' standing construction of these roads is supervised by the Bureau of Public Roads.

The mileage constructed during the fiscal year and to date in the several parks is shown in table 36.

TABLE 36.—*Mileage of national-park roads improved under the supervision of the Bureau of Public Roads*

National park or monument	Mileage completed under supervision of the Bureau		National park or monument	Mileage completed under supervision of the Bureau	
	During fiscal year 1934	Total to June 30, 1934		During fiscal year 1934	Total to June 30, 1934
Acadia.....	3.9	7.8	Mount Rainier.....	6.5	61.3
Bryce Canyon.....	1.8	16.2	Petrified Forest.....	9.6	26.3
Colonial National Monu- ment.....	1.0	11.0	Rocky Mountain.....	2.1	38.9
Crater Lake.....	3.5	41.6	Scott's Bluff.....	.0	.6
Devils Tower National Monument.....	.0	.3	Sequoia.....	6.5	39.3
General Grant.....	.0	6.4	Shenandoah.....	.0	40.1
Glacier.....	7.1	54.4	Washington, D.C.....	.7	.7
Grand Canyon.....	21.4	151.1	Wind Cave.....	8.6	15.3
Great Smoky Mountains.....	4.0	4.0	Yellowstone.....	63.2	156.1
Hawaii.....	4.7	24.9	Yosemite.....	8.7	65.1
Lassen Volcanic.....	.0	30.4	Zion.....	3.4	18.9
Mesa Verde.....	.0	20.4	Total.....	156.7	831.1

During the past fiscal year Bureau activities on park-road construction were greatly expanded and the National Park Service was expanded to include national military parks, battlefields, and cemeteries. Over \$20,000,000 has been appropriated for road construction under supervision of this Bureau in the national-park areas.

In the Western States the largest and most expensive project constructed by this Bureau was the Red Lodge-Cooke City National Park Approach road to Yellowstone National Park. This project lies in Montana and Wyoming and comprises a northeast entrance to Yellowstone Park. It is approximately 60 miles long, and on June 30, 1934, approximately 43 miles were complete. The remaining 17 miles will be completed during the season of 1934. Contracts have been let providing for surfacing and oiling of the road which will be done during 1935.

Another large project undertaken for the National Park Service is the Cameron-Desert View east approach to Grand Canyon National Park. The entire project is not complete, but approximately 18 miles were completed during the past year, and it is expected that the road will be graded and surfaced during 1935.

One new park of importance enters the list of those in which roads have been built by the Bureau, that of Great Smoky Mountains National Park in North Carolina and Tennessee. One project was completed during the past year. A very large project involving approximately \$750,000 is under construction in this park.

Surveys and plans are progressing rapidly on the Shenandoah-Great Smoky Mountains Parkway connecting Shenandoah National Park in Virginia and Great Smoky Mountains National Park in North Carolina and Tennessee. An initial appropriation of \$3,960,000 has been made for this project. When completed this road will extend along the ridge of the Blue Ridge Mountains and will be one of the most scenic mountain drives in the eastern part of the country.

The Green Mountain Parkway in Vermont is another large project which is now being surveyed. No funds have been appropriated for the construction to date, but a \$40,000 allotment has been made for survey and plans.

Nearly \$12,000,000 of road work is under construction with funds made available by the National Industrial Recovery Act. Of this amount approximately \$8,000,000 is under construction in the West and \$4,000,000 in the East. These figures represent 78 projects of which 61 are located in the West and 17 in the East.

INTER-AMERICAN HIGHWAY

A report of a reconnaissance survey for the proposed Inter-American Highway from Panama to the United States was prepared during the first half of the fiscal year and transmitted to the Department of State on January 22, 1934. The President of the United States in turn transmitted this document to the Congress on March 6. Printing of the report as a congressional document was authorized by Senate Resolution 271, under date of June 6.

The report covers reconnaissance surveys over the proposed line of the highway through the Republics of Panama, Costa Rica, Nicaragua, Honduras, and Guatemala, supplemented by aerial photographs.

In addition to necessary engineering details and cost estimates, with plan and profile maps, the report contains detailed analysis of the economic characteristics of each of the countries involved. The five republics listed above made official request for the reconnaissance survey, but the report treats also of the countries of El Salvador and Mexico which are traversed by the highway. The entire route from Panama City to Nuevo Laredo, Mexico (on the boundary between Mexico and the United States) is approximately 3,200 miles long.

The continued interest of the Congress in this project was evinced by its authorization in June 1934 of \$1,075,000, in two separate bills, for further survey and initial construction activities.

TRANSPORTATION AND ECONOMIC AND STATISTICAL INVESTIGATIONS

WASHINGTON REGIONAL AREA TRAFFIC SURVEY

Compilation of a report on a traffic survey of the regional area of Washington, D.C., was nearing completion.

Detailed recommendations with regard to proposed new routes and bridges are a part of the report, and data with regard to present volume of traffic, the type and composition of this traffic, and studies of its normal movement are also presented. This material will be found useful in the study of numerous problems which are not touched upon in the report itself. Large savings in right-of-way and construction costs should be realized from the detailed data and recommendations resulting from the survey.

INDIANA TRAFFIC SURVEY

The fieldwork of the Indiana traffic survey was completed in the fall of 1933, and since that time the Bureau has had no personnel on the work. The analysis has been handled in accordance with the agreement by the State highway commission. The survey was largely for administrative purposes of the State Highway Commission of Indiana and a report will be issued by the commission.

NEW JERSEY TRAFFIC SURVEY

Field operations for a survey of traffic upon the entire State highway system of New Jersey and upon a limited mileage of the principal county routes were completed in September 1933, and the resulting report is now in process of preparation.

The report will contain data with regard to the origin and destination of truck traffic, the nominal capacities and body types of trucks, their classification as owner-operated, contract haulers, or common carriers, and as of interstate or intrastate operation, the origin and destination of all vehicles observed at the Hudson and Delaware River crossings, and the determination of passenger-car traffic upon each of the highway systems which is local to each county or which originates in other areas.

FLORIDA TRAFFIC SURVEY

A 12-month survey of traffic on the highways of Florida was begun in September 1933.

This project is to obtain complete data with regard to present use of the State highway system. At certain major points in the citrus area, the volume and movement of citrus-hauling trucks will be studied. Complete analysis of the volume and movement of tourist traffic, together with detailed data with regard to their expenditures, speed of travel, purpose in visiting Florida, length of stay, and areas of origin, are a part of the survey.

CONNECTICUT TRAFFIC SURVEY

Field work on a 12-month survey of traffic in Connecticut was begun in October 1933.

Truck data relating to origin and destination, classification of trip as city or country; situs of ownership of vehicles, as city, village, or farm; and classification of operators as private, contract haulers, or common carriers, are a part of the project. The volume of trucks engaged in railway service will be obtained and trucks will be weighed at all points where scales are available.

ARKANSAS TRAFFIC SURVEY

Field work was begun at approximately 250 points in Arkansas in April 1934.

Data for passenger-car and bus traffic will cover the following items: State of registration, route used, classification of trip as State or interstate, situs of ownership, and travel, with either origin or destination at railroad stations. The same information will be obtained for trucks, and, in addition, information with regard to the following: Make of vehicle; wheel loads (obtained by weighing on portable scales); rated capacity; number of trailers; classification, as owners, contract haulers, or common carriers; commodities carried; and whether or not return loads are picked up.

TRAFFIC CAPACITY AND INTERSECTION STUDIES

The studies of intersection efficiency were continued, to include analysis of the movement of vehicles at some 20 intersections, most of which were operated under at least two different control methods. The results of the Seventeenth Street and Constitution Avenue analysis (Washington, D.C.), and of the study of the time saving over the New Jersey high-level viaduct, were presented before the Highway Research Board, and were reported also in Public Roads.

New and improved methods of recording developed during the year have made possible studies of the movement of individual vehicles. These methods will permit analysis of highway capacity under various conditions of traffic and alignment, of vehicle speeds on the open highway, and of the efficiency of intersections carrying the heaviest traffic volumes.

ORGANIZATION OF AMERICAN ASSOCIATION OF MOTOR-VEHICLE ADMINISTRATORS

Continuing its interest in the problem of greater uniformity in State laws and regulations affecting the registration of motor vehicles and their operation on the highways, the Bureau participated in the formation of the American Association of Motor Vehicle Administrators at a meeting held in Chicago in September 1933. This new organization comprises in its membership the various State administrative officials having jurisdiction over all phases of motor-vehicle operation. It embraces four regional groups (East, South, Midwest, and West), all of which had been officially organized with closely similar constitutions and bylaws by the end of June 1934. The Bureau holds an active membership in the national association, and acts in an advisory capacity with the regional groups. This new organization is regarded as an effective channel for contacts with the growing movement toward promotion of safety on streets and highways and greater uniformity in State motor-vehicle laws.

NATIONAL CONFERENCE ON STREET AND HIGHWAY SAFETY

The Bureau assisted in the holding of the Fourth National Conference on Street and Highway Safety, at Washington, D.C., in May 1934. This conference adopted a revision of the Uniform Motor Vehicle Code, bringing this document up to date.

The code now contains the following acts, designed for the consideration of and enactment by State legislatures: (1) Uniform motor vehicle administration, registration, and certificate of title and antitheft act; (2) uniform motor vehicle operators' and chauffeurs' license act; (3) uniform motor vehicle civil liability act; (4) uniform motor vehicle safety responsibility act; (5) uniform act regulating traffic on highways. Two other documents completed the work of the conference—a model municipal traffic ordinance and a manual on uniform traffic-control devices. The conference attracted a large attendance of public officials and other traffic specialists from all parts of the country, whose collective experience and judgment were embodied in the uniform acts as adopted.

STUDIES OF TAXATION

A series of studies of the finances of various States, with special reference to highways, was continued during the past fiscal year.

An inquiry into the tax situation in New Hampshire was conducted. Similar studies were begun in Minnesota, Colorado, Wyoming, and New Mexico. The results of investigations of this character in Wisconsin, Illinois, and Michigan have already been published. The general purpose of all these studies is to establish the relation of highway taxes paid from different sources and by different groups of citizens to highway expenditures, and to lay down a broad basis for adjustment of highway taxes on a rational plan.

MOTOR-VEHICLE TAXATION IN 1932

A special statistical survey of motor-vehicle taxation in the United States in the year 1932 was made during the past fiscal year, and the resulting report is now being prepared for publication. This inquiry elicited, for the first time, facts in complete detail regarding the many types of fees and taxes paid by owners of all classes of vehicles in all the States. Another phase of the survey related to local fees and taxes, including county and municipal imposts, and personal-property taxes. This investigation revealed both the extent and diversity of motor-vehicle taxes, and showed total collections in the year 1932 of slightly more than 1 billion dollars.

WIDTH OF HIGHWAY USED BY VEHICLES IN PASSING

Observations were made of highway traffic in the vicinity of Baltimore, Md. to obtain information concerning the position upon the highways of various types of vehicles in the act of passing one another in either direction, as well as the longitudinal distance required for completing the passing maneuver when the vehicles are moving in the same direction. A motion-picture camera mounted in an observer's car moving in the stream of traffic was used. It is planned to publish the results of these tests.

RAILROAD LINE ABANDONMENT STUDIES

By arrangement with the Interstate Commerce Commission and the American Railway Association, the bureau undertook to make studies of branch lines and sections of railroad proposed for abandonment, with a view to ascertaining the effect of such action on highway traffic in the immediate vicinity. Cases studied included both those under formal application to the Interstate Commerce Commission and those informally proposed by the railroads through the American Railway Association. A detailed inspection was made of the territory served by the existing railroad, with special reference to the amount of traffic which would result if freight transported by rail should be carried on the roads, and to the condition of the existing roads leading from each population center or railroad station to the nearest available station after abandonment. The potential highway traffic was estimated as an annual daily average in truck loads based on a 5-year period, and for maximum average truck loads per day for the peak month.

Distances, types of road, condition of bridges, and other relevant features were reported, in order that a definite determination might be made as to the amount and kind of highway construction or reconstruction which would be necessary to provide equivalent service to that furnished by the rail line proposed for abandonment.

During the fiscal year 72 cases were studied, involving 1,893 miles proposed for abandonment, distributed among the States as shown in table 37.

TABLE 37.—*Sections of railroads proposed for abandonment and inspected during fiscal year*

State	Projects	Railroad	High-ways in-spected	State	Projects	Railroad	High-ways in-spected
	Number	Miles	Miles		Number	Miles	Miles
Alabama.....	1	21.00	60	Missouri.....	7	204.50	373
Arkansas.....	3	112.10	242	New Hampshire.....	4	102.70	171
Delaware.....	1	34.60	78	New Jersey.....	2	15.46	31
Florida.....	1	27.42	48	New York.....	2	28.88	48
Illinois.....	2	39.83	85	North Carolina.....	2	17.74	52
Iowa.....	3	72.85	134	Oklahoma.....	1	10.61	13
Kansas.....	7	445.23	673	Pennsylvania.....	4	74.63	132
Kentucky.....	3	63.52	185	Tennessee.....	3	39.66	149
Louisiana.....	1	43.05	35	Texas.....	3	127.23	256
Maryland.....	1	5.00	12	Virginia.....	4	69.44	176
Massachusetts.....	3	24.53	78	West Virginia.....	1	8.00	24
Michigan.....	2	45.64	124	Wisconsin.....	6	151.18	283
Minnesota.....	4	70.36	159				
Mississippi.....	1	37.90	89	Total.....	72	1,893.06	3,712

This work was done for the purpose of determining the selection of secondary or other roads which should be built to serve communities in the regions of the abandonments.

PRODUCTION-COST STUDIES

PRODUCTION COSTS ON RELIEF PROJECTS

During the past year requirements in the administration of highway work, especially those pertaining to employment of labor, and assistance in connection with such activities as drought relief, flood relief, and civil works, necessitated a considerable curtailment of the usual production studies.

However, the drought and flood-relief road work carried on in nine States since the fall of 1933 has produced much valuable information and experience aside from providing needed road improvements and giving employment to needy farmers. At the period of maximum activity during the fiscal year about 20,000 local destitute workers in 8 States were given employment and their efforts utilized so effectively that on the whole every dollar of public expenditure is believed to have yielded a dollar's worth of useful and needed improvement. This belief is based on many concrete and exact data from each of these States. Reports from Kansas may serve as an example.

In the 18 drought-stricken counties of southwestern Kansas the Kansas State Highway Commission in cooperation with Federal authorities provided employment for able-bodied, needy farmers in the improvement of some of the most important of their local roads. During November and December 1933 and January 1934, the State highway commission started 59 of these road projects, using men taken from the relief and civil-works lists. These 59 road projects involved a total of 349 miles, but during the 3 months the major part of the actual work was confined to approximately 126 miles, on which a total of 1,270,000 cubic yards of excavation were moved, mostly with fresnoes, culverts were constructed, the roadway and slopes finished, right-of-way cleared, and fences built—all at a total cost of \$337,500. Applying the total cost to the grading only results in a cost of 26.6 cents per cubic yard. Of this total expenditure, 88.4 percent was paid directly to the laborers for personal services and the use of their personally owned teams and trucks. The remaining 11.6 percent was spent largely in the purchase of materials and in providing supervisory labor and the necessary tools and equipment. These expenditures include all miscellaneous and incidental labor connected with the completion of the road, such as finishing the slopes and shoulders, placing culverts (but not the cost of culvert materials), moving and erecting fences, together with some long-haul fills and clay and caliche surfacing in which wagons and trucks were used and the materials loaded by hand. Table 38 shows the relative average amount of human and team labor required per cubic yard on this work.

TABLE 38.—*Man-hours and horse-hours per cubic yard of excavation on relief projects in Kansas*

Class of work	All grading work except wagon and truck haul ¹	Jobs using only fresnoes	Wagon- and truck-haul work with hand loading
	Hours	Hours	Hours
By men:			
Dirt-moving organization.....	0.299	0.338	1.259
Hand finishing slopes.....	.106	.103	-----
All other labor.....	.045	.044	.028
Total man-hours per cubic yard of excavation.....	.450	.485	1.287
By horses:			
On fresnoes.....	.520	.505	.104
On plows.....	.098	.098	.110
On wagons.....	.008	.038	.474
On all other work.....	.040	.026	.036
Total horse-hours per cubic yard of excavation.....	.666	.667	.724

¹ Includes 8 jobs on which the elevating grader was used to throw up approximately 84,200 cubic yards on the grade. Total yardage handled exclusively by fresnoes was 1,140,700; by elevating grader, 84,200; and by trucks and wagons, 47,500. Wage rates were almost uniformly 40 cents an hour for labor and 7½ cents an hour for horses.

While the primary object of this work was to provide relief and consequently the crews were not always well balanced in respect to the number of teams available and the individual members changed a great deal, it is clear from table 38 that the production rates per man-hour and per horse-hour are very creditable for this type of work. These people not only supported themselves, their families, and their livestock throughout the winter by their own efforts, but in doing so they made a definite contribution to the future welfare and improvement of their communities in the form of needed public highways, which in mileage and in quality represent a value fully equal to the total outlay.

Continuing former studies of the extent to which labor profits from the construction of high-type pavements in which mechanical equipment plays an important part, a number of corollary studies have been carried on to determine more fully the returns to labor from other types of construction. Considerable time has been devoted to obtaining adequate records of the amount of employment actually provided by the current State and Federal-aid highway-construction program in each of the several States. As a part of this plan a weekly record is obtained of the number of persons actually employed on State and Federal road work. This provides a definite means of predicting the total amount of employment which would be provided by any given expenditure.

It was found impossible to continue active field work on a number of studies during the past year, and the data which had been obtained were analyzed and prepared for publication. Reports were prepared on the construction of high-type bituminous pavements, some new relations bearing on concrete mixtures, and power-shovel operation in highway grading.

The first report is based on the analysis of detailed studies on 23 bituminous paving jobs. The causes of reduced production rates and high unit costs are given and methods whereby these causes may be eliminated or reduced are discussed.

STUDIES OF CONCRETE MIXTURES

Studies of concrete mixtures have developed indications of certain relations not heretofore established between the proportions of the solid ingredients of the concrete, the water content, and the strength and density of the resulting concrete. These relations may be stated briefly as follows:

For a particular combination of sand and cement a relation exists between the amount of coarse aggregate and (1) the total voids in the concrete mixture and (2) the amount of water required for basic or any relative proportion of basic water contents.¹

¹ Basic water content is that amount of water which produces maximum density in a particular combination of materials. Quantities of water expressed in terms of basic water content (as a ratio) are referred to as relative water contents.

Likewise, for a particular coarse aggregate content, a relation exists between the ratio of the amounts of sand and cement in the mixture and (1) the amounts of water required as the basic and various relative water contents, and (2) the corresponding total voids in the mixture. As the sand-cement ratio is uniformly increased, a uniform change occurs in the amount of water required for the basic and each relative water content and the total voids in the concrete corresponding to each. In these tests, increase in the ratio of sand to cement resulted in an increase in both the amounts of water required for each relative water content and the corresponding total voids in the concrete.

For each relative water content, using the same kinds of materials, the slump of every concrete mixture will be the same, regardless of the proportions of cement and aggregate used in it.

GRADING STUDIES

In the studies of power-shovel operation in highway grading it was found that the management was the most important single factor affecting production costs; that the hauling usually presented more difficult problems than the digging and loading; and that in rock or hard ground the drilling and blasting are frequently the most poorly managed operations on the job. These studies cover several hundred projects distributed over practically all parts of the country and should therefore form a fairly accurate indication of present practice, as well as a basis for evaluating the efficiency of different methods of operation and procedure.

The studies begun last year of the man-hours and equipment-hours involved in the numerous unit items of the various types of highway construction were discontinued soon after the opening of the fiscal year. The need for more precise knowledge of the amount of human labor required in each road-building and maintenance operation, and the extent to which the labor element varies with different methods and different kinds of equipment is so urgent, however, that these studies should be resumed at the earliest opportunity. In adopting means for relieving unemployment, both the legislator and the administrator are in need of comprehensive data.

HIGHWAY ACCOUNTING METHODS

The Bureau has continued its efforts to further the development and installation of efficient accounting procedures by highway-building agencies. It has a direct interest as a result of its cooperation with the States in road construction and also because of its collection of general statistics in the highway field. Accurate and complete information in regard to the various activities in which a highway department is engaged is a prerequisite to efficient administration. Efficient and effective statistical and accounting control is necessary not only for administrative reasons but also to provide the engineering organization with proper means for determining costs and properly evaluating and comparing the relative merits and demerits of both new and old procedures, methods of operation, and types of organization. For these accumulations of experience and data to be of the widest possible value it is necessary that the statistical methods, terms, and nomenclature be uniform among the several States so that the accomplishments of one can be fairly compared with those of any other. As yet, such comparisons can be made only between a few States. The aim of the Bureau is to provide a system of accounts and records that will be economical in operation, will fully meet all accounting requirements of a department, and will provide quickly and in practical form complete statistical information on any desired activity in which a department is engaged, and which shall be fully comparable with similar activities in any other State. Cooperative work along these lines was continued during the year insofar as time and opportunities would permit.

PHYSICAL RESEARCH

MOTOR-VEHICLE IMPACT INVESTIGATIONS

The current research in this field is the study of the effect on pavement surfaces of the suddenly applied forces developed by motor-vehicle impact as compared with the effect of static or slowly applied forces of the same magnitude. Preparations have been made for laboratory tests under carefully controlled conditions of temperature and moisture. These tests will be made upon massive specimens of concrete mounted as cantilevers utilizing a specially designed pendulum-type impact machine to produce the impact. This machine, now practically completed, consists of a structural frame carrying a vertical pendulum

100 inches in length with a motor-truck wheel mounted at its center of percussion. The pendulum is to be swung against the vertical face of the test specimens and the strains and deflections of the specimens under the resulting impact reaction will be measured and compared with those caused by an equivalent static force.

Twenty-six specimens have been fabricated and are ready for test. Essential preliminary calculations and calibration tests have been made.

SUBSURFACE EXPLORATIONS

This new investigation has for its object the development of instruments and operating technic which will reveal subsurface formations of rock or other materials of concern in the construction of highways and highway structures.

At the outset of the work in September 1933, two independent scientific methods for sounding relatively shallow rock depths were considered as being probably most suitable. Both of the methods have been used extensively in mining and, to some extent, for shallower work. One involves the measurement of the electrical resistivity of the soil while the other, known as the seismic method, depends on the propagation and measurement of sound waves through the earth. As the first method mentioned is the simpler it was given first attention and a convenient and practical field apparatus has been designed, built, and given a considerable amount of use locally. Results to date justify the belief that this method of test can be used to advantage for determining the amount of rock excavation in highway construction, for locating dredging and quarry material, and for determining rock depths for bridges or other structures.

For the seismic tests a three-element oscillograph has been designed and is now under construction. It is believed that this method will be particularly useful in connection with bridge construction.

HIGHWAY-BRIDGE INVESTIGATIONS

Tests to determine the friction developed in the sliding of expansion bearings in highway bridges were described in the reports of the last 2 years. The originally scheduled tests in this investigation have been completed and a few additional tests involving other combinations of metals are now being made. The data which have been obtained are being analyzed and a detailed report is being prepared.

MEASUREMENT OF ROAD-SURFACE ROUGHNESS

The development of a standardized vehicle for use with the relative roughness indicator as described in last year's report has been continued. Because of certain difficulties encountered in the spring action of the single-wheel trailer, the development has been directed toward a means for satisfactorily damping the spring motion and considerable progress has already been made in this effort.

INVESTIGATION OF CONCRETE PAVEMENT DESIGN

Studies of the structural action of concrete-pavement slab and joint designs have been conducted actively throughout the year and the original program of tests is now practically complete. The scheduled tests to develop the efficiency of joint designs and of the relative balance of cross-sectional designs have been completed.

Advantage was taken of the unusual temperature conditions of the past winter to obtain data concerning the effects of subgrade freezing on the load resistance of pavement slabs. Valuable data on the magnitude and distribution of stresses due to restrained warping have also been obtained. Two of the five scheduled reports on this project are in practically final form and the others are in the course of preparation.

INVESTIGATIONS OF NONBITUMINOUS ROAD MATERIALS

PORTLAND CEMENT

During the year work was started on two laboratory investigations designed to develop information regarding the effect of variations in the chemical composition of portland cement on the durability of concrete. In one series a number of specially prepared cements differing widely in composition are being subjected

to an accelerated weathering test in combination with sands of both good and poor quality. In the other series, which is being conducted simultaneously in eight research laboratories under the sponsorship of the Highway Research Board, 11 brands of commercial portland cements differing in composition are being subjected to alternate freezing and thawing. This problem is of importance in connection with concrete for pavements and bridges, since in certain sections of the country structures are subjected to severe weathering and there is good evidence that the quality of the cement may affect the resistance of the concrete to weathering to a considerable extent.

AGGREGATES

Several investigations dealing with the methods of testing and the physical properties of stone, gravel, sand, etc., are being continued. These tests are being conducted, for the most part, in cooperation with various standardizing bodies, such as the American Association of State Highway Officials and the Highway Research Board. Additional information regarding the possibilities of the Los Angeles rattler test, referred to in the report of last year, was obtained and a report prepared for the use of the committee on materials of the American Association of State Highway Officials. Additional data were obtained in the development of improved laboratory methods of testing the soundness of aggregates. This work, conducted in cooperation with the American Association of State Highway Officials, contributed toward the adoption of two new tentative association standards covering methods of conducting soundness tests of aggregates.

CONCRETE

The promising results indicated by the series of tests to determine the effect of finishing pavement concrete by vibration led to a decision to continue this investigation during the coming year. In this work the latest types of vibrating equipment are being studied. As a result of the work done already along this line, a marked interest has been developed in this method of finishing which, from present indications, may eventually displace the methods now in use.

The study of methods for curing concrete has been temporarily delayed owing to the pressure of other work. However, the necessary equipment has been constructed and the tests will be conducted during the coming year. Tests of lightweight aggregates have been completed and a report is now being prepared for publication. Further tests were also made in connection with the standardization of the flexure test used in the control of paving concrete. Certain variables which may affect the results were investigated.

Recent inspections of concrete specimens stored in Medicine Lake, S.Dak., to determine the effect of various surface treatments in protecting the concrete against alkali attack indicate that, insofar as specimens treated with water-gas and coal-gas tar are concerned, resistance to attack is increased by (1) lowering the water-cement ratio, (2) increasing the length of the moist-curing period, (3) treating the concrete after as short a drying period as possible subsequent to moist curing, and (4) by the use of a coal-tar seal coat following initial priming with water-gas tar.

JOINT FILLERS

A recent development in preformed joint fillers for concrete structures, particularly pavements, has been the introduction of the so-called "resilient type" to replace the conventional plastic fillers which have been in use for many years. The results of a laboratory investigation designed to compare the efficiency of various types of resilient fillers, such as cork, sponge rubber, fiber, etc., were published during the year. The major conclusions from this investigation are as follows:

Considering the essential features of the resilient types of filler, as determined by the tests described in the report, the different types studied may be rated as follows: Sponge rubber and cork, fiber, and asphalt-rubber.

The different samples of sponge-rubber filler exhibit a considerable range in physical characteristics, which warrants careful investigation of any particular material prior to use.

A compression test with three edges restrained is believed suitable for testing resilient expansion-joint fillers. Measurements of the recovery, extrusion, and applied load can be made in a single test.

INVESTIGATIONS OF BITUMINOUS MATERIALS AND BITUMINOUS PAVING MIXTURES

Several years ago the Bureau conducted an investigation of sheet-asphalt and asphaltic-concrete paving mixtures on a circular track or roadway at the Arlington Experiment Farm. The foundation for the experimental sections of bituminous pavement was a reinforced concrete base 13 feet wide and 180 feet in mean diameter. Two series of tests were made and involved a total of 60 test sections which were subjected to a traffic of heavy trucks. The test sections in the first series were subjected to 50,000 truck trips and the second series to 64,000. The observed performance under this traffic, as affected by the variables included in the various sections, furnished the data for a report which has been published during the past year.

Two of the experimental projects, built in cooperation with State highway departments for the study of low-cost bituminous-treated surfaces, are active at the present time. One of these is in South Carolina and the other in Nebraska. The project in South Carolina is for the study of bituminous surfacings of several types on bases of marl and sand-clay. In Nebraska the experiments are with mixed-in-place construction in the sand-hill area of the State, the mineral aggregate being the soil material of the area which is largely blow sand. Periodic inspections are made of both projects and records of maintenance costs and service behavior are being kept.

Mention has been made in previous reports of the cooperative effort of the Bureau, the State highway departments, and the asphalt industry to simplify the tests and standardize specifications for the liquid asphaltic materials which are used extensively in low-cost road construction. A review of the 1933 specifications of the State highway departments for materials of this character indicates substantial progress in obtaining acceptance of the provisional standard specifications which have been recommended. This work is being continued and another series of regional meetings will be held during the coming year for the further promotion of uniformity in the requirements of specifications.

The investigations of the weather-resisting properties of liquid asphaltic materials, undertaken 2 years ago, are being continued. In these studies the basic changes occurring in such materials, when exposed to atmospheric conditions, are determined and the results correlated with the results of various laboratory tests. The ultimate purpose is the development of methods of test which will insure the use of durable materials and thereby result in minimum maintenance costs. A report of the work done during the summer of 1932 has been published and the data obtained in 1933 are being assembled for publication. The investigation has been broadened to include a study of the weathering properties of bituminous mixtures subjected to atmospheric exposure and controlled traffic. For this purpose a small circular track, similar to the indoor track described in last year's report, has been constructed out of doors. This phase of the study includes asphaltic materials from different producing fields and refined by different manufacturing processes.

The studies of low-cost bituminous mixtures on the indoor circular track, described in last year's report, are being continued.

The laboratory study of the factors essential to the proper design of hot bituminous paving mixtures is being continued. The work consists largely of making stability tests. A future phase of this investigation will be a correlation of the service behavior of bituminous pavements with the results of the stability tests.

SUBGRADE INVESTIGATIONS

Subgrade investigations have formerly been directed toward the establishment of the fundamental relationships of the physical phenomena observed when soils are subjected to load and variable climatic conditions. During the past year the work has taken on a somewhat more practical aspect in that it has been directed mainly toward the preparation of available information in such form as to make it more readily usable by the highway engineer, and the development of apparatus and procedures for attacking particular problems of highway construction.

The routine procedures for testing subgrade soils, referred to in last year's report, have been recommended to the American Association of State Highway Officials and the American Society for Testing Materials for adoption as tentative standards and, if accepted, will become a uniform basis for the formulation of specifications throughout the country.

Reports on hydraulic-fill settlement and on frost heave in highways and its prevention, which show the value and application of subgrade information in

practice, have been published. Continued investigation of the mechanical device for determining the liquid limit of soils has indicated its suitability for standardizing the liquid-limit test in various laboratories, as well as for revealing information of a character not furnished by any other test. A procedure for determining the centrifuge-moisture equivalent, which will eliminate the relatively expensive centrifuge, is being investigated and appears promising at the present time.

A standard procedure for performing the flocculation test has been established. This test has proved particularly valuable in differentiating between the good and poor varieties of limerocks, caliches, etc.

Continued research on the hydrometer method of mechanical analysis of fine-grained materials has led to the publication of two reports, the first dealing with the accuracy of the method, and the second detailing a procedure for making the mechanical analysis of portland cement. In addition, progress has been made in the development of a method for rapid mechanical analysis suitable for control purposes in the field. This method will eliminate the use of sieves and scales to a large extent.

A report describing a procedure for selecting soils suitable for use in mud-jacking operations has been published and further investigations of this process may furnish additional information of practical value.

The combined compression and permeability apparatus as proposed by Charles Terzaghi, has proved valuable in the investigation of special problems relating to the behavior of soils under load and in the presence of water. Recent investigations of the expansive action of soils on absorbing water indicate a possible solution of the problem of warping of concrete pavements. These investigations will be continued on an enlarged scale.

A series of admixture tests has confirmed the statement previously made that certain simple tests were satisfactory for indicating the presence of the various soil constituents. A project has been inaugurated to determine the stability requirements of soils used in various parts of the highway structure and to investigate means of increasing the stability by admixture and manipulation. The apparatus used in these tests will include the drainage indicator and soil consolidator. The material tested will include the coarse as well as the fine fractions of soil. Since the purpose of the investigation is to furnish practical information regarding the construction of low-cost roads, base courses, earth fills, and the like, the results of the research will ultimately be carried to the field for demonstration.

Observations of the Virginia demonstration road have been continued and a progress report is in preparation.

Cooperation with the State highway departments in the making of subgrade surveys, in the design of subgrade treatments and road surfaces, and in the establishment of soil laboratories, has continued as in past years.

REPORT OF THE SOLICITOR, 1934

UNITED STATES DEPARTMENT OF AGRICULTURE,
OFFICE OF THE SOLICITOR,
Washington, D. C., September 18, 1934.

SIR: I submit herewith report of the work of the Office of the Solicitor for the fiscal year ended June 30, 1934.

Respectfully,

SETH THOMAS,
Solicitor.

HON. HENRY A. WALLACE,
Secretary of Agriculture.

It is of interest to record that, for the first time in more than a dozen years, no regulatory laws were added by Congress, during the fiscal year, to the list of those already administered by the Department and, consequently, the increase in the legal work of this Office which has always followed such additional laws has not resulted. However, by reason of an amendment to the Perishable Agricultural Commodities Act, 1930, which made it more effective, the number of complaints filed began to increase at once, immediately necessitating a corresponding increase in the work of the Office, with the probability of further increase in the future. The work of the Office was also increased very greatly in one of its divisions, namely, the Division of the Acquisition of Lands under the Weeks forestry law, owing to the transfer to this Department, pursuant to Executive Order No. 6208 of July 21, 1933, of \$20,000,000 for the purchase of forest lands, from funds appropriated to carry out the provisions of the National Industrial Recovery Act of June 16, 1933. Performance of the legal work incident to the acquisition of the 7 million acres, proposed to be purchased incident to the transfer of these funds, had, up to the close of this fiscal year, necessitated the employment of upwards of 150 title attorneys, abstractors, and clerical assistants.

Our relations with the officials of the Department of Justice and with the United States attorneys in the various States and the District of Columbia have continued to be very cordial and effective, and they have been mutually helpful. There has been a continuance of the assistance rendered to the United States attorneys by the practice of this office in preparing and submitting the complaints in 28-hour law violations and, when practicable, the libels in food and drug cases, as well as indictments and informations in practically all criminal cases reported for prosecution under the regulatory laws of the Department. Petitions for condemnation of lands under the Weeks forestry law and other acts have also been prepared in this Office for use by the United States attorneys in the conduct of condemnation proceedings. The Department's litigation as conducted by the United States attorneys has been greatly facilitated by the preparation of these various pleadings.

The work of the Office has been conducted economically and expeditiously during the fiscal year, and a summary of the work accomplished in statistical form and with some detail with respect to the various laws administered follows.

GENERAL SUMMARY OF WORK

Five hundred and thirty-eight written opinions were rendered to administrative officials of the Department. No record was kept of the legal advice

given to these same officials in daily informal conferences or of brief opinions expressed in writing on papers sent to the Office for consideration or criticism.

Twenty employees of this Department, arrested while in the performance of their official duties for alleged violations of traffic regulations, were represented at the hearings and trials by attorneys of this Office.

Nine hundred and eighteen notices of judgment were prepared for publication, pursuant to the authority given in the Food and Drugs, Insecticide, and Federal Caustic Poison Acts.

In addition to the criminal prosecutions hereinafter tabulated, 1,707 decrees of condemnation and forfeiture were entered under the Food and Drugs Act, Insecticide Act, Federal Caustic Poison Act, and the Federal Seed Act.

There were reported to the Attorney General 1,761 violations of statutes entrusted to the Department for enforcement.

Table 1 shows the several statutes under which violations were reported and also the amounts of fines, penalties, and other recoveries in cases settled with and without contest. Table 2 summarizes the number of contracts and leases prepared or examined except those involving the Federal Highway Act and other acts supplemental thereto, which are reported on page 13.

TABLE 1.—Cases reported, fines imposed, and judgments recovered, 1934

Laws involved	Cases	Fines, etc.
	<i>Number</i>	<i>Dollars</i>
Insecticide Act.....	44	1,984.25
Food and Drugs Act.....	338	43,903.00
Meat Inspection Act.....	30	2,226.00
Federal Seed Act.....	35	650.00
Federal Caustic Poison Act.....	6	105.00
Standard Container Act.....	2	50.00
Farm Products Inspection Act.....	1	0
Produce Agency Act.....	5	1,600.00
Export Apple and Pear Act.....	1	0
Animal quarantine laws.....	20	1,200.00
Plant Quarantine Act.....	9	280.00
28-hour law.....	38	9,500.00
Upper Mississippi River Wild Life and Fish Refuge Act.....	3	15.00
Migratory Bird Treaty Act.....	452	4,500.00
Bird and animal reservation land.....	3	0
National forest laws.....	46	37,735.11
Total.....	1,033	103,748.36

Many cases involving alleged violations of regulatory laws were given consideration but were not reported to the Department of Justice because of the absence of evidence sufficient to warrant prosecution.

TABLE 2.—Contracts and leases proposed or examined, fiscal year 1934

Bureau, division, or office	Contracts	Leases	Total	Bureau, division, or office	Contracts	Leases	Total
Agricultural Adjustment Administration.....	12	9	21	Library.....	5	0	5
Agricultural Economics.....	0	43	43	Division of Operations.....	0	11	11
Agricultural Engineering.....	9	4	13	Food and Drug Administration.....	15	1	16
Animal Industry.....	10	41	51	Forest Service.....	1,540	25	1,565
Biological Survey.....	10	4	14	Grain Futures Administration.....	0	2	2
Chemistry and Soils.....	8	2	10	Personnel and Business Administration.....	15	5	20
Dairy Industry.....	9	5	14	Weather Bureau.....	33	40	73
Entomology.....	1	19	20	Total.....	1,714	291	2,005
Home Economics.....	2	0	2				
Plant Industry.....	20	30	50				
Plant Quarantine.....	25	25	50				
Public Roads.....	0	25	25				

In addition to the items listed in table 2, there were submitted, for examination as to sufficiency of form and execution, numerous contracts prepared by various bureaus and by individuals and corporations. A considerable portion of the contracts prepared by this Office during the year related to

Public Works Administration projects, and all contracts and leases were made subject to the applicable codes, pursuant to Executive Order No. 6646, except those specifically excepted therefrom by the National Industrial Recovery Administration. In a number of cases of refusal by contractors to execute the required compliance certificate, it devolved upon this Office to refer the cases to that Administration for a waiver, if the circumstances warranted, or for such action as might be deemed proper.

During the year, 17 bonds covering Department employees, and 294 renewals and 55 terminations of leases and contracts were prepared. In addition to the examination of the above-tabulated contracts and the bonds connected therewith for sufficiency as to execution, there were examined for sufficiency of form and execution 14 stipulation and consent agreements in connection with bonds covering Department officials and 985 cooperative agreements with State experiment stations and others covering experimental work of various kinds. There were also examined as to sufficiency of form and execution, 38 bid bonds submitted in connection with proposed contracts and 240 bonds of indemnity covering advances of funds under the Subsistence Expense Act of 1926 and the act of June 3, 1902. In connection with these bonds numerous letters were written to the surety companies involved, in reply to their letters of inquiry relative to the status of the bonds from the standpoint of accounting for advances and the retiring of such bonds where they were no longer required. As shown in detail later, there were also examined 9,045 highway-project statements and highway-project agreements and modifications thereof.

Four hundred and sixty-two certifications of papers, records, and bulletins of the Department were prepared at the request of litigants, for use by them as evidence in court proceedings.

Five claims of balances due estates of deceased employees were examined, necessary papers were prepared for their payment, and advice was given to the administrative officials on matters pertaining thereto.

During the year, a large number of residents of the several States made inquiries of the Department concerning legal matters in which they were personally interested. While the subject matter of these requests, in many instances, did not fall within the scope of the activities of the Department, it was endeavored in every case to furnish such information as was consistent with the Department's policy and, in all instances, a courteous reply to such letters was sent to the persons desiring the information.

Seventy-five claims involving damages to privately owned property resulting from the alleged negligence of employees of the Department while engaged in the performance of their official duties were considered under the act of December 28, 1922, and advice given with respect thereto. The various bureaus of the Department also, in a great many instances, received informal advice with reference to the handling of such claims.

Nine miscellaneous cases, arising out of automobile accidents and covering damage claims for the recovery of money on behalf of the United States, were referred to the Department of Justice. Six of such cases were closed during the fiscal year. In other instances, payment of claims was secured without litigation as a result of correspondence from this Office.

Twenty claims, involving damage to privately owned property under contract or hire to the Forest Service, were considered under the act of March 4, 1913, as amended by the act of January 31, 1931.

Seventeen claims presented for consideration under the terms of the act of May 27, 1930, providing for reimbursement for damage to private property caused by employees of the United States in connection with the protection, administration, and improvement of the national forests, were also considered and adjusted.

In addition to the handling of claims under the 3 acts above mentioned, 10 other claims involving various charges were also decided in this Office.

This Office also assisted in the preparation of administrative and official regulations, orders, and memoranda of the Secretary, and prepared and examined numerous executive orders and proclamations. Assistance was also given in the preparation of legislation affecting the Department.

Attorneys in this Office conducted and participated in or attended numerous hearings under the Packers and Stockyards Act, the Perishable Agricultural Commodities Act, the Grain Standards Act, the Plant Quarantine and Animal Quarantine Act, and the Grain Futures Act. A hearing on charges under the Packers and Stockyards Act against a number of the large packers has been in progress at Jackson, Miss., and Birmingham, Ala., since May 14 and will prob-

ably continue for a considerable additional period. One of the hearings under the Grain Futures Act involved charges against one of the largest operators on the Chicago Board of Trade. Numerous conferences were held with business concerns and their attorneys respecting patents, matters arising under the Grain Futures Act, the Perishable Agricultural Commodities Act, the Packers and Stockyards Act, the United States Warehouse Act, the Food and Drugs Act, and various other regulatory laws.

Assistance was given in the preparation of amendments to the Perishable Agricultural Commodities Act which are now included in the amendatory act of April 13, 1934, Public, No. 159. A bill covering all the subject matter contained in the present Food and Drugs Act, and very materially extending it, was prepared during the fiscal year. Conferences were held and assistance given to outside attorneys and the House and Senate committees in regard to proposed amendments to the Packers and Stockyards Act, 1921, dealing mainly with the question of direct buying. In response to a request from the Senate committee, an amendment to the Packers and Stockyards Act was drafted to provide for the licensing and regulation of dealers and handlers of live poultry in interstate commerce at important terminal markets. Assistance was given in drafting the act of June 14, 1934, Public, No. 342, enabling the purchase of lands under the Weeks Act with the consent of the governor of any State not in a position to give its formal consent until the next meeting of its legislature. Advice and assistance were given administrative officers of the Department and attorneys representing outside interests in drafting proposed amendments to the Grain Futures Act. In connection with the administrative officers of the Forest Service, assistance was rendered to the Secretary of the Interior and the Attorney General in considering the bill regulating grazing on the public lands which was approved by the President June 28, 1934, Public, No. 482. Statements of issues, briefs, and memoranda on other legal matters were prepared at the request of the officials of the Department for submission to the Attorney General, the Secretary of the Interior, the Commissioner of Patents, the Administrator of Public Works, and the Comptroller General.

Amendments to the regulations governing the occupancy and use of the national forests were considered as to their legal sufficiency, and desirable changes were suggested. The regulations for carrying out the provisions of the Perishable Agricultural Commodities Act, 1930, as amended April 13, 1934, were reviewed as to their legal sufficiency, and changes were suggested; also, regulations under the Cotton Standards Act, Cotton Futures Act, and the Grain Standards Act.

Briefs and memoranda on legal questions involved in many of the cases reported to the Attorney General for prosecution were prepared, and assistance was also given to the United States attorneys in the trials of the cases. Among the more important of these were: *Fred O. Morgan, doing business as Fred O. Morgan Sheep Commission Co., et al. v. United States of America and the Secretary of Agriculture*; *C. H. Acker et al. v. United States of America and the Secretary of Agriculture*; *Union Stock Yards Co. of Omaha, Ltd., v. United States of America and the Secretary of Agriculture*; *Thomas J. Inghram, doing business as T. G. Inghram Co. of Omaha, Ltd. v. United States of America and the Secretary of Agriculture*; all under the Packers and Stockyards Act; *United States v. Yates Lumber Co.*, under the Standard Container Act of 1916; *United States v. Jersey Package Co.*, under the Standard Container Act of 1928; *United States v. Lovel H. Turnbull*, and *United States v. Robert T. Cochran & Co.*, both under the Produce Agency Act; *United States v. Harry Saturo Kuramoto*, under the Food Products Inspection Law; *Abe Rafelson v. Secretary of Agriculture*, and *Andrew Cuttone & Son v. Secretary of Agriculture*, both under the Perishable Agricultural Commodities Act; *United States v. Aaron B. Weinstein*, *United States v. J. A. Trimble & Co.*, *United States v. August Becker*, and *United States v. Purse Bros.*, involving suits for collecting penalties under the Perishable Agricultural Commodities Act; *United States v. The Grand Mesa Resort Co.*, and *United States v. Lake Hemet Water Co.*, which were suits to restrain the companies from exercising exclusive control over certain lakes within the Grand Mesa National Forest for fishing and boating; and *United States v. George A. Threlkeld*, which was a condemnation suit for right-of-way within the Lincoln National Forest; *United States v. Lester Tilton, trading as Tilton Laboratories*, *United States v. 70 Barrels, more or less, of Vinegar*, *United States v. 65 Barrels, more or less, of Vinegar* (2 cases), *United States v. 350 Cartons of Canned Sardines*, *United States v. George A. Breon & Co., Inc.*, a corporation, *United States v. Feeders*

Supply & Manufacturing Co., a corporation, *United States v. 59 1-Pint Bottles of a Product labeled in part "Fluid Extract Ergot"*, *United States v. 33 Packages, more or less, of an article of drugs labeled in part "Ora Noid Mouth Powder"*, all arising under the Food and Drugs Act; and *Gibbs & Conover v. Wohl*, and *Brogden & Trowbridge v. Henry*, involving patents.

Bills for various purposes referred to the Department for comment by committees of Congress were examined, and assistance was rendered in the preparation of reports thereon. Among the bills so considered were the following:

S. 1658, providing for the protection of migratory birds.

S. 1944, the proposed food and drug bill.

H. R. 1602, an act to amend Perishable Agricultural Commodities Act.

H. R. 5632, the duck stamp bill.

H. R. 6462, making provisions for grazing.

H. R. 8402, the cotton control bill.

H. R. 8861, the sugar bill.

S. 2899, providing for the establishment of Commodity Division in the Department of Agriculture.

THE NATIONAL FORESTS

During the fiscal year there were handled 153 claims to lands within the national forests which were initiated under the public-land laws of the United States. Decisions were rendered on 41 of these claims, 37 of which were favorable to the Government and 4 were unfavorable.

Attorneys of this Office participated in the trials of 32 court cases and represented the Government before the United States local land offices in 34 hearings. There were handled also 173 trespass cases involving property of the United States in national forests.

Oral advice was frequently given, and numerous opinions relating to the administration of the national forests were submitted. There were prepared or passed upon for legal sufficiency 2,756 legal papers of various kinds.

Work for the Forest Service during the fiscal year, other than that under the Weeks forestry law, included handling the following cases and other business:

Claims to lands pending during year	153
Hearings attended	34
Briefs prepared and filed	25
General litigation and settlement	109
Contracts, leases, bonds, etc.	1,489
Bills, complaints, informations, protests, etc.	60
Abstracts of title examined	527
Court appearances	32
Written opinions	464
Stipulations	22
Trespasses:	
Grazing	33
Fire	33
Timber	17
Property	16
Occupancy	34
Miscellaneous	40
Cases under State laws	139

The amount of damages sustained and the fines imposed in 46 cases are shown in table 3.

TABLE 3.—*Trespass cases on the national forests in which damages and fines were recovered, fiscal year 1934*

Character of trespass	Cases	Amount of damages	Fines imposed
	<i>Number</i>	<i>Dollars</i>	<i>Dollars</i>
Grazing	16	6,921.10	
Timber	9	1,752.74	
Fire	11	28,469.47	
Property			
Occupancy	6	126.80	
Miscellaneous	4	265.00	200
Total	46	37,535.11	200

CASES OF INTEREST

In an action against the forest supervisor to recover possession of land within the Luquillo National Forest, Puerto Rico, the Circuit Court of Appeals for the Second Circuit held that the suit was not against the United States so that it was not an indispensable party. The court therefore reversed the decision of the lower court, which had dismissed the complaint, and remanded the cause for further proceeding. The case is reported under the title *Correa v. Barbour*, 71 Fed. (2d) 9.

A suit is now pending in the United States District Court for Colorado for an injunction to restrain the Grand Mesa Resort Co. from unlawfully asserting and maintaining exclusive possession and control of certain lakes within the Grand Mesa National Forest. The Government is also asking that the company be enjoined from excluding and preventing the public from using the lakes for all lawful purposes, and from interfering with the Government's officers, agents, and employees in their administration of the lakes as a part of the national forest. Nearly all of the land flooded by the lakes and reservoirs is owned by the United States, but the company claims the right to exclusive possession of them because of its having obtained a grant under the Irrigation Right of Way Act of 1881 authorizing it to enlarge them for irrigation purposes. The case is one of unusual interest and of great importance in the administration of the national forests.

A similar case against the Lake Hemet Water Co. involving a lake within the San Bernardino National Forest, Calif., has been referred to the Department of Justice. The United States attorney and the regional law officer of this Department at San Francisco are now engaged in preparing the case for institution of suit.

The circuit court of appeals at Wichita, Kans., rendered a decision July 28, 1934, in *United States v. George A. Threlkeld*, upholding the right of the Government to condemn a right-of-way for a logging road and additional facilities over private lands in the Lincoln National Forest, N. Mex. It was held that the appropriation for the construction and maintenance of roads, trails, etc., was sufficient for this purpose. The court said that the language of the appropriation was very broad and vested wide discretion in the Secretary to determine the kind, character, and location of the roads and also the nature, extent, and location of other improvements necessary to the use of the national forest. It was also pointed out that the act does not provide that the roads or other improvements must be exclusively within the national forest and that Congress must have had in mind that the use of private land might be necessary. The broad authority for construction and maintenance of roads and other improvements was held to include authority to acquire land for that purpose if necessary. This case is very important to the administration of the national forests since it removes any doubt as to the authority of the Department to acquire private lands when necessary for the construction of roads and other improvements.

WEEKS FORESTRY LAW

(36 Stat. 961)

The legal work incident to the acquisition of lands under the Weeks forestry law, approved March 1, 1911 (36 Stat. 961), and under the Clarke-McNary Act, approved June 7, 1924 (43 Stat. 653), as amended, was greatly augmented by Executive Orders Nos. 6135, of May 20, 1933, 6160, of June 21, 1933, 6181, of June 24, 1933, and 6208, of July 21, 1933, allocating moneys from the emergency conservation fund (War transfer to Agriculture, act of Mar. 31, 1931).

The contemplated program of acquiring 7,000,000 acres of land made necessary large additions to the personnel of both the Washington office and the field forces engaged in the work. During the early months of the year efforts were centered to a great extent on the organization and training of the legal force and assistants to handle this enormous program. It was not easy to obtain men and women qualified and experienced in title work who would leave their private practice to engage in Government service, and the personnel employed required considerable training in Government practice, procedure, and requirements before they could be safely detailed to the responsibilities of title work. It was also necessary to locate, equip, and establish offices at points central

and convenient to the county seats and United States forest offices in the many areas. However, it is believed that the preliminary work incident to the examination of land titles has now been practically accomplished.

The National Forest Reservation Commission at the seven meetings held during the fiscal year authorized the acquisition of 4,619 offerings, in 23 States, aggregating 4,644,134 acres. Of the land authorized for purchase, titles to 2,397,000 acres have been examined; the acquisition of 525,190 acres has been completed; suits are pending in the United States district courts for the acquisition by condemnation proceedings of 153,822 acres; and petitions for the institution of condemnation proceedings for the acquisition of 45,498 acres have been prepared and submitted to the Attorney General. Of the remaining area examined, it has been found necessary to hold in abeyance, pending clearance of title by vendors, approximately 400,000 acres. The rest of the lands, titles of which have been examined, are in the process of being reported and reviewed preliminary to acquisition by deed or by proceedings in condemnation, according to the condition of the titles.

FOOD AND DRUGS ACT

(34 Stat. 768)

At the beginning of the fiscal year there were pending in the courts 647 cases under the Federal Food and Drugs Act, 254 of which were criminal and 393 civil. During the year 420 criminal cases, involving 1,083 violations, were reported to the Department of Justice, and 1,934 civil cases, a total of 2,354 cases. There were thus pending during the year 674 criminal and 2,327 civil cases, a total of 3,001. During the year 401 criminal and 1,850 civil cases were terminated, a total of 2,251, leaving 273 criminal and 477 civil cases, or a total of 750 cases, pending at the close of the fiscal year.

The 401 criminal cases disposed of were terminated as follows: 278 upon pleas of guilty and the imposition of a fine; 1 upon plea of guilty to part and plea of nolo contendere to part of the information and the imposition of a fine; 50 on pleas of nolo contendere and the imposition of a fine; 9 after jury trials in which verdicts were returned in favor of the Government and the imposition of a fine; 36 on being nolle prossed or dismissed; 6 upon verdicts being returned finding the defendant not guilty; 2 on pleas of guilty and the placing of the defendants on probation; 2 upon dismissal by the court after pleas of nolo contendere had been entered; 1 on plea of nolo contendere, and the suspension of sentence; 1 on plea of guilty and suspension of sentence; 1 on dismissal by the court after plea of guilty had been made; 1 on plea of guilty, deferment of sentence, and the placing of the defendant on probation; 1 on its being stricken from the docket with leave; 6 on their being barred by the statute of limitations, and 6 because the information had not been filed. Fines were imposed as shown in table 4.

TABLE 4.—*Fines imposed in criminal cases (exclusive of costs, which were generally assessed) under the Food and Drugs Act, fiscal year 1934*

Number of cases	Amount of fine	Total	Number of cases	Amount of fine	Total	Number of cases	Amount of fine	Total
4.....	\$1	\$4	63.....	\$50	\$3, 150	6.....	\$300	\$1, 800
2.....	2	4	1.....	60	60	2.....	350	700
1.....	3	3	1.....	70	70	1.....	375	375
10.....	5	50	13.....	75	975	5.....	400	2, 000
1.....	6	6	1.....	80	80	1.....	450	450
22.....	10	220	1.....	90	90	3.....	500	1, 500
3.....	15	45	42.....	100	4, 200	2.....	600	1, 200
1.....	19	19	2.....	120	240	1.....	800	800
8.....	20	160	1.....	125	125	1.....	900	900
65.....	25	1, 625	1.....	130	130	3.....	1, 000	3, 000
4.....	26	104	8.....	150	1, 200	1.....	2, 000	2, 000
1.....	28	28	1.....	180	180	1.....	4, 200	4, 200
1.....	29	29	24.....	200	4, 800	1.....	4, 500	4, 500
8.....	30	240	1.....	225	225			
3.....	32	96	1.....	240	240			
7.....	40	280	8.....	250	2, 000	Total (338).....		44, 103

Of the 1,850 civil cases terminated, 1,185 were terminated by default decrees; 466 by consent decrees; 5 after trials in which verdicts were returned in favor of the Government; 3 after trials in which verdicts were returned in favor of the claimant; 1, in which claimant was refused possession of the goods under bond, by the goods being delivered to charity; and 190 by being dismissed chiefly because no seizure of the goods had been effected.

Eight hundred and seventy-two Notices of Judgment were prepared and published during the year.

CASES OF INTEREST

The case of *United States v. Lester Tilton, trading as Tilton Laboratories*, tried in the District Court of the Southern District of Iowa, at Davenport, was a criminal proceeding instituted by information in six counts. The charge was based upon the interstate shipment of certain drugs, to wit, Pyroligneous Compound No. 1, Pyroligneous Compound No. 2, and Healing Ointment. The first count charged the drug to be adulterated in that Pyroligneous Compound No. 1 was reported to be a germicide and a disinfectant, which statements were false. The second count was withdrawn from the consideration of the jury. The four counts remaining charged misbranding in that the curative and therapeutic claims therein made were false and fraudulent. The claims made are in part as follows: Pyroligneous Compound No. 1 for ulcers of the stomach, sore mouth, pyorrhea, and sore tonsils; Pyroligneous Compound No. 2 for goiters, swollen glands, varicose veins; healing ointment for boils, carbuncles, abscesses, tonsillitis, and varicose ulcer; and they were false and fraudulent in that the statements were applied knowingly and in reckless and wanton disregard of their truth or falsity, so as to represent that the article was composed of ingredients or medicinal agents effective as a proper treatment for the diseases named on the labels.

The case was tried to the court and jury. It was shown from bacteriological tests made by a Government witness that the drug named in the first count was not a germicide or a disinfectant, and by a number of medical experts that the drugs in question were worthless in the treatment of the diseases for which they were recommended and in some instances harmful.

Defendant introduced a number of lay witnesses who testified to the use of certain of the drugs, in the treatment of diseases with which they believed they were afflicted, and for which the drugs were recommended, and that relief had oftentimes been obtained and in other cases cures effected. There was no evidence introduced of a medical examination of the lay witnesses to prove that they were really suffering from certain diseases.

At the conclusion of the evidence and the court's charge to the jury, a verdict was returned finding defendant guilty on five counts. The court assessed a penalty of \$200 on each count, together with costs.

The cases of *United States v. Seventy Barrels, more or less, of Vinegar* and *United States v. Sixty-five Barrels, more or less, of Vinegar*, tried in the District Court for the Eastern District of Wisconsin at Milwaukee, were seizure proceedings to condemn and forfeit a large number of barrels of vinegar involved therein. The two cases were consolidated and tried together before the court and a jury. The libels in each case charged the vinegar to be adulterated in that commercial acetic acid and evaporated-apple-products vinegar had been mixed and packed with the article so as to reduce, lower, and injuriously affect its quality and strength and had been substituted for cider vinegar. The libels further charged that the vinegar was misbranded in that the name cider vinegar applied to such an article was false and misleading and deceived and misled, and that the product was offered for sale under the distinctive name of another article. The testimony on the part of the Government was that dried-apple-products vinegar and commercial acetic acid were present in the product in each case and that the vinegar was not apple-cider vinegar which the label purported the article to be and that the vinegar was offered for sale under the distinctive name of cider vinegar. The evidence adduced on behalf of claimant, Martin D. Buckley, doing business under the name of W. E. Mathers Vinegar Co., at Medina, N. Y., was that the vinegar was pure apple-cider vinegar. At the conclusion of the evidence and the court's charge to the jury, a verdict was returned for the Government finding that the vinegar in each case was both adulterated and misbranded, as charged in the libels, and judgment of condemnation was entered accordingly.

The case of *United States v. Three Hundred Fifty Cartons of Canned Sardines, more or less*, in the District Court for the Western District of Pennsylvania, at Pittsburgh, was a seizure proceeding to condemn and forfeit a large quantity of canned sardines. The libel charged that the sardines were adulterated in that they consisted in part of a decomposed animal substance. At the trial of the case before the court and a jury the testimony on the part of the Government was that of 217 cans collected as samples from the shipment in question, from 35 percent to 42 percent contained decomposed fish. The testimony on the part of Van Camp Sea Food Co., Inc., of the State of California, claimant in the case, was that a number of cans of post-seizure samples of the shipment had been examined by different parties and that no evidence of decomposition had been found; that the processing of the fish in the factory was done with care and in addition thereto careful inspection, during the processing, had been maintained by State inspectors of the proper department of the State of California.

At the conclusion of all the evidence the jury returned a verdict for the Government, and judgment was entered accordingly.

The case of *United States v. George A. Breon & Co., Inc.*, a corporation, tried in the District Court of the Western District of Missouri, at Kansas City, was based on criminal information containing four counts. The first count charged adulteration in that the capsules, the drug in question, were represented by their label to contain one-fourth grain desiccated thyroid and that their strength and purity fell below the professed standard, since the capsules contained more than one-fourth grain desiccated thyroid. The second count charged the drug to be misbranded in that the representation that each capsule contained one-fourth grain desiccated thyroid not being correct was false and misleading. The third and fourth counts charged adulteration and misbranding respectively. Defendant filed a motion to quash the information and also a demurrer thereto, which were overruled by the court. Defendant then filed a motion for a bill of particulars, which motion was denied by the court. A jury was waived, and the case was tried to the court. At the close of the Government's case in chief, the court found for the defendant on the first count; and at the conclusion of all the evidence found for the defendant on the third and fourth counts. After argument of counsel on the second count, the court found that the evidence as to this count on the part of the Government, as well as that of the defendant, proved that the capsules contained more than one-fourth grain of desiccated thyroid and were therefore misbranded, found the defendant guilty as charged therein, and imposed a fine of \$25 and costs. The case is now pending on appeal by the defendant in the Circuit Court of Appeals for the Eighth Circuit.

The case of *United States v. Feeders Supply & Manufacturing Co.*, a corporation, tried in the District Court of the Western District of Missouri, at Kansas City, was a criminal information containing two counts. Each count charged the interstate shipment of misbranded cottonseed cake and meal, in that the article was deficient in protein, the amount of protein being less than the amount described on the label. A jury was waived, and the case was tried to the court. At the conclusion of all the evidence, the court found that the protein content of the article in question was less than the declared amount and that the defendant was guilty as charged in the information, and assessed the penalty at a fine of \$1 on each of the two counts, together with costs.

The case of *United States v. Fifty-Nine 1-Pint Bottles of a Product Labeled in Part "Fluid Extract Ergot"*, was tried in the Southern Division of the Northern District of California, at San Francisco. The libel charged that the drug in question was adulterated in that it was sold under a name recognized in the United States Pharmacopoeia and differed from the standard of strength as determine the tests laid down therein. It further charged that the drug was misbranded in that the statement on the label, "Fluid Extract Ergot USP", was false and misleading. A jury having been waived, the case was tried to the court; the result was a verdict for the claimant, the court holding that the drug in question was not adulterated or misbranded within the meaning of the Food and Drugs Act and dismissed the libel and directed the return of the drug under seizure to claimant.

The case of *United States v. Thirty-Three Packages, more or less, of an Article of Drugs Labeled in part "Ora-Noid Mouth Powder"*, was tried in the Eastern District of Wisconsin, at Milwaukee. The libel charged that the Ora-Noid Mouth Powder, the drug in question, was misbranded in that it was represented by statements appearing on its label and in the circular contained

within the package as having curative and therapeutic value. A jury was waived, and the case was tried to the court. The testimony on behalf of the Government was to the effect that the statements appearing on the label and in the circular concerning the curative and therapeutic effect of the article were false and fraudulent. At the conclusion of the evidence on the part of the Government, claimant failing to introduce any testimony in its behalf, the court found that some of the statements, as to the curative and therapeutic value of the drug, were made with knowledge of their falsity and other statements were of such nature as to indicate that they were made without knowledge of the subject matter and in reckless and wanton disregard of their truth and falsity and were therefore false and fraudulent. A decree of condemnation was entered and the article under seizure ordered destroyed.

THE INSECTICIDE ACT

(36 Stat. 331)

Eighty-five cases were reported to the Attorney General during the fiscal year, in 50 of which criminal proceedings were recommended. The remaining 35 cases reported were civil or seizure cases, brought against products alleged to be adulterated or misbranded. At the beginning of the year, 19 cases were pending, 10 of which were criminal and 9 civil or seizure cases.

Of the 60 criminal cases either pending at the beginning or reported during the year, please of guilty were entered in 29, please of nolo contendere were entered in 5, and 3 were dismissed, leaving 23 criminal cases pending.

Of the 44 civil or seizure cases either pending at the beginning or reported during the year, 19 were terminated by the entry of default decrees of condemnation and destruction, 2 by consent decrees of condemnation followed by the taking of the goods down under bond for reconditioning or relabeling, and 7 were dismissed, leaving 16 civil or seizure cases pending.

The fines imposed in the criminal cases referred to above consisted of \$400 in 1 case, \$320 in 1 case, \$200 in 1 case, \$100 in each of 4 cases, \$60 in 1 case, \$50 in each of 6 cases, \$25 in each of 9 cases, \$18.75 in 1 case, \$15.50 in 1 case, \$10 in each of 3 cases, and \$5 in each of 3 cases, the total of the fines being \$1,984.25.

Thirty-six notices of judgment were prepared and published under section 4 of the act, being Notices of Judgment 1260 to 1295, inclusive.

MEAT INSPECTION ACT

(34 Stat. 1260)

Thirty-one cases were reported to the Attorney General for prosecution under the Meat Inspection Act during the fiscal year. Twenty-four cases were pending at the beginning of the year.

Convictions were secured in 34 of these, resulting in the assessment of penalties as shown in table 5. In 4 cases jail sentences were given, in 3 of which the sentences were suspended and the defendants placed on probation. In 2 cases the grand jury returned "no bill", and 2 other cases were dropped without prosecution.

Eight cases from the previous year and nine cases reported during this fiscal year are still pending.

TABLE 5.—*Penalties imposed in meat-inspection cases, fiscal year 1934*

Number of cases	Fines imposed	Total fines	Number of cases	Fines imposed	Total fines
1.....	(¹) \$1,000	\$1,000	1.....	\$26	\$26
1.....	250	250	16.....	25	400
1.....	125	125	3.....	10	30
1.....	100	100			
5.....	50	250	Total (30 cases).....		2,226
1.....	45	45			

¹ \$1,000 and 3 months in jail.

VIRUS SERUM TOXIN ACT

(37 Stat. 832)

Advice was given to administrative officers on various legal questions arising in connection with the enforcement of the Virus Serum Toxin Act.

NAVAL STORES ACT

(42 Stat. 1430)

No Naval Stores Act cases were instituted during the year. Two criminal informations, however, were prepared and at the close of the fiscal year were awaiting supporting affidavits, which were being prepared and were to be forwarded to the Department of Justice for prosecution.

Advice and informal opinions upon various legal matters arising in the administration of this statute were rendered to administrative officials.

FEDERAL SEED ACT

(37 Stat. 506)

At the beginning of the fiscal year there were 15 criminal and 17 seizure cases pending under the Federal Seed Act. During the year 14 criminal and 21 seizure cases were reported to the Attorney General. Eight of the criminal cases were terminated as follows: 6 on pleas of guilty with fines of \$50 imposed in each of 4 cases, and fines of \$200 in each of 2 cases; 1 on plea of nolo contendere with a fine of \$50, and 1 on the jury's disagreeing and the case being discontinued. Twenty-eight of the seizure cases were terminated—11 by consent decrees, 16 by default decrees, and 1 because no seizure was made. There were thus pending at the close of the fiscal year 21 criminal and 10 seizure cases.

FEDERAL CAUSTIC POISON ACT

(44 Stat. 1406)

At the beginning of the fiscal year 2 seizure and 2 criminal cases were pending under the Federal Caustic Poison Act. During the year 4 seizure and 2 criminal cases were reported to the Attorney General. Five of the seizure cases were terminated—1 by a consent decree, 3 by default decrees, and 1 because the libel was not filed. Three of the criminal cases were disposed of by pleas of guilty, in which a fine of \$50 was assessed in 2 cases and a fine of \$5 in 1 case. There were pending at the close of the fiscal year 1 seizure and 1 criminal case.

Ten notices of judgment were prepared and published during the year.

PLANT QUARANTINE ACT

(37 Stat. 315)

Prosecutions were instituted under the Plant Quarantine Act in 13 cases during the year by United States attorneys on information furnished by the Department. Of these, 9 were closed by the imposition of fines, 1 by suspension of sentence, and 3 by dismissal. Two cases pending at the close of the fiscal year 1933 are still pending.

TABLE 6.—*Fines imposed in plant-quarantine cases, fiscal year 1934*

Number of cases	Amount of fine	Total	Number of cases	Amount of fine	Total
1 -----	\$5	\$5	2 -----	\$50	\$100
3 -----	10	30	1 -----	100	100
1 -----	20	20			
1 -----	25	25	Total (9 cases) -----		280

Eight written opinions were given on legal questions submitted by officials of the Bureau of Plant Quarantine, and many informal opinions were given in conference with such officials. Conferences were also had with reference to the revision of existing quarantines or of the regulations supplemental thereto as follows: Fruit and vegetable quarantine (no. 56); Japanese beetle quarantine (no. 48); pink bollworm quarantine (no. 47)—three conferences; *Thurberia* weevil quarantine (no. 61); and the seed or paddy rice quarantine (no. 55). Conferences were had or hearings attended in connection with the quarantine on account of the Dutch elm disease (no. 70); the extension of the Japanese beetle quarantine (no. 48); and the pink bollworm quarantine (no. 47).

Six written opinions were given on legal questions submitted to Members of Congress or other persons outside of the Department with reference to its activities under the plant quarantine law.

ACTS RELATING TO THE INTERSTATE MOVEMENT OF LIVESTOCK FROM QUARANTINED DISTRICTS, PROHIBITING THE INTERSTATE MOVEMENT OF DISEASED LIVESTOCK, ETC.

(23 Stat. 31; 26 Stat. 414; 32 Stat. 791; 33 Stat. 1264)

Three cases were reported to the Attorney General for prosecution under the act of May 29, 1884 (23 Stat. 31), and all were pending at the close of the year. Of the cases pending at the close of the preceding fiscal year, 1 was terminated by a fine of \$200 and sentence of the defendant to 30 days in jail, 6 by dismissal, and 1 by the refusal of the grand jury to indict. There were 8 cases pending at the close of the year.

Seventeen cases were reported to the Attorney General for prosecution under the act of February 2, 1903 (32 Stat. 791), of which 2 were terminated by fines of \$100 each. Of the cases pending at the close of the preceding fiscal year, 1 was terminated by a fine of 1 cent, 8 by fines of \$100 each, 8 by dismissal, and 1 by the refusal of the grand jury to indict. There were 24 cases pending at the close of the year.

No cases were reported to the Attorney General for prosecution under the act of March 3, 1905 (33 Stat. 1264). One case, pending at the beginning of the fiscal year, is still pending.

In all, 20 cases were reported to the Attorney General during the year, and 33 cases are still pending. In the enforcement of these laws, 1 case was disposed of by the imposition of a fine of 1 cent, 10 by fines of \$100 each, and 1 by a fine of \$200 and a 30-day jail sentence.

One case under title 18, section 88, United States Code, involving an alleged conspiracy to violate the act of February 2, 1903, and one case charging an assault upon an employee of the Bureau of Animal Industry in violation of title 18, section 118, United States Code, which was pending at the beginning of the year, were still pending at the close thereof.

Regulations governing the sanitary handling and control of hides, skins, and other animal byproducts, etc., offered for entry into the United States (B. A. I. Order 341), and governing the appraisement of, and compensation for tuberculous cattle condemned and destroyed under the provisions of Public 42, Seventy-third Congress, approved April 7, 1934 (B. A. I. Order 344), were reviewed, as were also other orders issued by the Department in connection with the administration of the above-cited laws.

Eight bonds to insure the handling, in accordance with the regulations of this Department, of hides, skins, etc., imported from foreign countries were examined during the year.

TWENTY-EIGHT HOUR LAW

(34 Stat. 607)

Thirty-eight cases were reported to the Attorney General under the 28-hour law.

Penalties aggregating \$9,500 were recovered in 95 cases. Twenty-three cases were dismissed, and in one, a verdict was rendered for the defendant.

One hundred and one cases were pending at the close of the year.

FEDERAL HIGHWAY ACT

(42 Stat. 212)

During the last fiscal year, 2,727 original and 262 revised project statements for Federal road projects approved by the Department were first reviewed to determine whether they were eligible under the law. The amount of Federal funds which will be required by these projects is not yet determined as the Federal funds are allocated only as project agreements are entered into for the construction of projects or individual sections thereof.

Five thousand one hundred and twenty-two original project agreements and certificates of approval of plans, specifications, and estimates prepared by the Bureau of Public Roads were reviewed as to their form and sufficiency of execution by the State highway departments and were submitted to and executed by the Secretary. Of that number, 4,766 were project agreements entered into under the National Industrial Recovery Act and 356 were regular Federal-aid projects under the Federal Highway Act. These original and modified project agreements covered work estimated to cost \$310,025,646.98 and involved Federal funds in the amount of \$280,987,996.48, of which sum \$264,424,391.55 is from funds made available under the National Industrial Recovery Act, and \$16,563,604.93 is from funds made available under regular Federal-aid appropriations.* They involved also the improvement with Federal funds of 20,380.3 miles of road.

In addition, 197 original and 38 modified project agreements and certificates of approval for United States public-works relief-highway projects, prepared by the Bureau of Public Roads for execution by the State highway departments and the Secretary, were similarly reviewed. These projects involved the construction of 6,548.9 miles of road, financed 70 percent from the Federal Emergency Relief Administration for direct payment for labor performed and 30 percent from grants made by the Public Works Administration for payment through the Bureau of Public Roads. The total estimated cost of these projects was \$16,722,832.71.

There were, therefore, 8,346 separate project statement and agreement papers handled during the fiscal year, involving an aggregate expenditure of \$330,345,867.67. Of this sum, \$289,426,746.56 represented funds provided by the Federal Government. The total mileage for all classes of roads on which Federal expenditures were made was 26,929.2.

In addition to the foregoing, 167 cooperative agreements were entered into between the Department and the cooperating agency for constructing roads within or partly within the national forests, and 157 original construction contracts were entered into, after advertisement and award for their construction. All these cooperative agreements and construction contracts were reviewed as to form, substance, and sufficiency of execution. One original project statement and 1 original and 3 modified project agreements for flood-relief projects, involving \$15,128.31 Federal aid, were reviewed and approved for signature or execution.

There were also reviewed and approved for signature 32 original project statements for Federal-lands highway projects, under the act of June 24, 1930 (46 Stat. 805), and 10 original and 3 modified project agreements for Federal-lands highway projects were reviewed and recommended for approval by the Secretary. These Federal-lands highway-project agreements involved 402.9 miles of road and \$3,408,731.33 as the Federal share of the estimated cost of their construction.

During the year, two written opinions were given in connection with questions arising under the administration of the Federal Highway Act or the emergency legislation enacted in extension of or supplementary thereto. Many informal opinions were given also in conference with representatives of the Bureau of Public Roads on similar questions, as well as in connection with the issuance or revision of regulations promulgated pursuant to the Industrial Recovery Act of June 16, 1933, and supplemental legislation.

MIGRATORY BIRD TREATY ACT

(40 Stat. 755)

Four hundred and fifty-two cases were reported to the Attorney General, either directly or indirectly, under the Migratory Bird Treaty Act, and fines were imposed in 233 cases, as shown in table 7.

TABLE 7.—*Fines imposed under the Migratory Bird Treaty Act, fiscal year 1934*

Cases (number)	Amount of fine	Total	Cases (number)	Amount of fine	Total
4-----	\$0.01	\$0.04	24-----	\$15.00	\$360.00
1-----	.25	.25	2-----	20.00	40.00
11-----	1.00	11.00	61-----	25.00	1,525.00
2-----	2.50	5.00	18-----	50.00	900.00
45-----	5.00	225.00	9-----	100.00	900.00
1-----	4.00	4.00	Total (233 cases)-----		4,520.29
55-----	10.00	550.00			

In addition to \$50 fines, in 2 cases the defendants were sentenced to 30-day jail terms. In 11 cases of fines the defendants were assessed, in addition to such fines, costs in varying amounts. There were 21 jail sentences running from 1 to 90 days, with suspension in 6 cases during good behavior. Seven fines of \$50 were suspended, one on payment of costs. One \$25 fine and one \$100 fine were also suspended, the suspensions being predicated on the good behavior of the defendants. Eight defendants receiving fines of \$100 also received 6-month suspended jail sentences. In 2 cases defendants spent 1 hour in the custody of the United States marshal and in a third case, 1 day in custody. A 6-month suspended jail sentence was given in 4 cases. One defendant received a suspended sentence of 1 year, while three others received suspended sentences of 5 years. One defendant who was fined \$10 was given a 6-month suspended jail sentence, as were 3 other defendants who were fined \$25. One defendant was placed on probation for 1 year, another for 2 years. One hundred and six cases were dismissed, 32 nolle prossed, while 4 were stricken from the docket—1 with leave to reinstate. Eight cases were held to have been barred by the statute of limitation, and in 8 other cases the court refused to allow the informations to be filed. A no true bill was returned in 5 cases, and in 15 others the defendants were found not guilty. In 1 case where the defendant was found guilty a reprimand only was given.

The regulations of the Secretary under this act were revised during the year.

UPPER MISSISSIPPI RIVER WILD LIFE AND FISH REFUGE ACT

(43 Stat. 650)

Cases involving the purchase of 105.23 acres were submitted to the Attorney General for preliminary consideration and have not yet been approved. Six land-acquisition cases, involving 553.03 acres, were approved by the Attorney General and the title vested in the United States. Four condemnation proceedings involving 1,714.01 acres remain pending, awaiting final decree. Six condemnation suits involving 2,936.23 acres have been concluded and the title taken in the United States.

Three cases involving violations of the Upper Mississippi Wild Life and Fish Refuge Act were prepared and reported to the Attorney General for prosecution. Of the cases reported and of those previously pending, 11 were closed. In two of the cases the defendants were assessed costs and also received a term of 30 days in jail. A no true bill was returned in six cases. In three cases the defendants were fined \$5 each.

ALASKA GAME LAW

(43 Stat. 739)

The regulations of the Secretary of Agriculture under the Alaska game law were revised.

BIRD AND ANIMAL RESERVATION TRESPASS LAW

(Sec. 84 of the Penal Code)

Three new cases under the bird and animal reservation trespass law were reported to the Attorney General. Two cases were terminated during the fiscal year, both by dismissal of the charges.

NATIONAL INDUSTRIAL RECOVERY ACT LAND ACQUISITIONS

(48 Stat. 195)

Prince George's County, Md.—As additions to the animal husbandry farm near Beltsville there have been acquired by deed, 2,181.22 acres in seven tracts. One tract of 137.65 acres has been acquired by the filing of the declaration of taking and the payment of the estimated award into the registry fund of the United States District Court for the District of Maryland. Leases have been prepared and obtained covering other lands to be acquired under options expressed in the leases, and the survey and abstracts of title thereon are in process of preparation. One tract of 19.23 acres, with buildings thereon, has been acquired by condemnation proceedings as an addition to the dairy farm adjoining the animal husbandry farm but operated by the Bureau of Dairy Industry.

Bureau of Plant Industry acquisitions.—A declaration of taking has been prepared and filed covering the 112.987 acres in Lincoln County, Mo., for the Bureau of Plant Industry. A declaration of taking and payment of the estimated award have been made as to 158.71 acres in North Dakota for the Bureau of Plant Industry. The J. C. Duke tract in Iredell County, N. C., has been taken by declaration of taking. The Lucy Armstrong tract of 22.5 acres in Washington County, Miss., has been investigated as to title, but the acquisition is incomplete. The title to lands donated by the Mississippi State College has been investigated and reported to the Attorney General, but his final approval has not been obtained. In Prince George's County, Md., two tracts, comprising 413.9 acres, have been acquired by deed in connection with the establishment of the horticultural farm near Beltsville.

Mississippi County, Ark.—The title to various tracts of land to be acquired in connection with the improvement of the Big Lake refuge in Mississippi County, Ark., has not been obtained. Title to 322.63 acres of this area has been taken in the United States by the filing of declaration of taking and the payment of the estimated award into the registry of the United States District Court for the Eastern District of Arkansas.

BEAR RIVER MIGRATORY BIRD REFUGE EXCHANGE ACT

(45 Stat. 1186)

The matter of three exchanges of land, whereby the United States is to acquire about 10,000 acres more desirable for refuge purposes than the public and acquired land to be exchanged, is still pending before the Secretary of the Interior. Some progress has been made, but the transactions remain incomplete.

Several deeds have been obtained covering roadway rights-of-way for ingress and egress to and from this refuge.

MIGRATORY BIRD CONSERVATION ACT

(45 Stat. 1222)

Charleston County, S. C.—Title investigation was completed and the Attorney General's approval obtained as to 414.51 acres as an addition to the Cape Romain Wild Life Refuge. Upon a claim by the Cape Romain Land Co. that all their lands had not been paid for, schedules and reports were obtained, and information given to the claimant.

Garden County, Nebr.—In connection with the activities of the Lake Water Carrying Co., extensive consideration was given to the effect of their proposed

lowering of the level of Crescent Lake, and limitations upon their authority were imposed by the State board of public works.

Albany County, Wyo.—A declaration of taking was prepared and filed covering the C. P. Arnold tract of 964.80 acres, and title thereto was taken in the Bamforth Migratory Bird Refuge. A declaration of taking was prepared and filed and title taken in the United States for the Hutton Lake Migratory Bird Refuge to the John Goetz tract of 1,247.76 acres.

Superior County, Calif.—Title to 8,982.12 acres was taken and completed in connection with the establishment of the Salten Sea Wild Life Refuge, and the condemnation proceedings relating to said land were abandoned.

Hyde County, N. C.—Title to 900 acres in Hyde County, N. C., previously examined, was reported to the Attorney General and title vested in the United States. Extensive investigation was made relating to a claim by the Pamlico Timber Corporation alleging damage to their timber in connection with a fire which is said to have occurred during the survey of the Pamlico Timber Corporation tracts.

Burleigh and Kidder Counties, N. Dak.—All of the abstracts of title relating to lands not yet acquired for the Long Lake Wild Life Refuge have been continued. Four tracts comprising 1,034 acres, more or less, have been closed by the filing of a declaration of taking and the payment of the estimated award into the registry of the United States District Court under act of February 26, 1931.

Dorchester County, Md.—Deeds for telephone, roadway, and right-of-way were obtained, and various legal problems considered in connection with the improvement of the Black Water Wild Life Refuge.

Chatham County, Ga.—The injunction suit of *Langdon Cheves, et al v. E. B. Whitehead, game protector*, was tried in the district court and decided adversely to the United States. An appeal was taken to the United States Circuit Court of Appeals, and the matter was argued by a special representative sent by the Department of Justice. In the preparation of the brief and in the argument assistance was rendered by a representative of the Solicitor's Office of the Department of Agriculture. The decision of the lower court was reversed upon the ground that the title involved was doubtful and the equity court was not a proper place to try out a question of title to real estate. Advice has been given to the Bureau of Biological Survey with regard to the administration of the Savannah River wildlife refuge, including the Red Knoll plantation as a part thereof.

Executive orders and proclamations.—Various Executive orders have been prepared and passed upon relating to the setting aside of public lands for wildlife refuge purposes; and other Executive orders have been prepared or passed upon relating to the allocation of money for wildlife protection and other uses by the Department of Agriculture.

MALHEUR LAKE RESERVATION

(46 Stat. 1552, 1562)

The claims of the State of Oregon to the Malheur Lake refuge area are before a special master appointed by the United States Supreme Court in the suit of the *United States v. Oregon*. This matter is in charge of representatives of the Solicitor General, but assistance and cooperation have been given by the Department of Agriculture. The testimony, technical reports, and surveys prepared have been introduced in evidence, and the case has been argued and submitted for the special master's decision. Additional schedules called for by the master have been prepared and furnished.

The question as to the uses to be made of the Donner and Blitzen River waters is still pending before the State engineer of Oregon.

MOUNT VERNON MEMORIAL HIGHWAY

(45 Stat. 721)

There are still pending eight cases in the acquisition of lands for the Mount Vernon Memorial Highway. These cases will doubtless be closed shortly and all records will be returned to the Office of the National Park Service, Interior Department.

NATIONAL ARBORETUM

Five tracts of land were acquired under an Executive order issued by the President appropriating \$386,000 for said purchase. The number of acres involved in this purchase amount to 171, more or less.

PERSONNEL CASES

There were 16 cases, involving misconduct or indiscretion on the part of employees, that were passed upon legally and action taken by this Office.

BID WORK OF THE DEPARTMENT

In connection with the bid work of the Department, due to the emergency appropriations and the provisions of the various economy acts, the purchasing activities of this Department have been materially increased and have incidentally required constant application to the Solicitor's Office for interpretations of the decisions of the courts and of the Comptroller General affecting the various bids. The amount of bid work during the past fiscal year was considerably in excess of 4,000 cases, the sums involved aggregating more than \$9,000,000. The principal case involved was that of *Northwestern Motor Co. v. The Secretary of Agriculture and the Secretary of the Interior*, relative to "nonconsideration" of its bid on the grounds that it had failed to comply with the provisions of the N. R. A. and the President's Executive order in regard to contractors and suppliers signing certificates of compliance. The matter was submitted to the Supreme Court of the District of Columbia in a restraining order to restrain the Secretary of Agriculture and the Secretary of the Interior from disregarding the Northwestern Motor Co.'s bid, the company claiming to be the lowest responsible bidder. The matter was tried before Judge O'Donoghue, who held, in effect, that under this emergency program the requirement of the President was not an unusual one or an unreasonable one, and therefore the case was dismissed.

PATENTS

One hundred and fifty-one applications for letters patent covering inventions made by employees of the Department were given consideration during the year. Of these applications, the papers in 60 new cases were prepared during the past fiscal year. Forty-eight applications have been passed to patent, an increase of 18 over the preceding year. There are pending before the Patent Office 89 applications.

The Office has taken part in six interference proceedings declared by the Patent Office between applications for letters patent of employees of this Department and applications filed by outside parties. These proceedings involved the formal taking of testimony by the parties to the controversy, the filing of motions, the preparations of briefs, the submission of appeals to the various tribunals of the Patent Office and the Court of Customs and Patent Appeals, and the presentation of oral arguments. Two interferences have been concluded favorably to the Department employees and three interference cases are now pending before the Patent Office. In the remaining interference, priority to 2 counts was awarded to the outside party, priority to 1 claim of the patent previously granted to the Government employees being retained.

Many informal conferences were held with the examiners, and numerous responses to actions of the Patent Office were prepared and filed. Many questions presented by officials of the Department bearing on various phases of patent, trade mark, and copyright laws were considered and advice given.

CASES OF INTEREST

The interference case of *Howes v. Cheatham* involved a duplex fabric for use in the manufacture of bags for fruits and vegetables, the bags having open and close mesh sections and reinforced seams. Priority of invention was awarded to Robert J. Cheatham, an employee of the Department. A patent has been issued in his name covering the fabric and bag and is dedicated to the free use of the public.

The case was rather unusual in that the invention was first disclosed by Mr. Cheatham to Mr. Howes and an associate, both employees of the Bemis Brothers Bag Co., which circumstance compelled this Office to establish its case on the corroborating testimony of hostile witnesses. The question involved was more one of originality than priority, since both Mr. Cheatham and Mr. Howes claimed conception of the invention as of the same time and place and when in each other's company. Cheatham had no corroborating witness, an almost indispensable requirement to prevail under Patent Office practice, while Howes' associate corroborated him in every respect. However, the associate of Howes was impeached as a witness, not because of any lack of integrity, but, as stated in the decision, because of an apparent excess of imagination. This left the oral testimony of Cheatham opposed to the oral testimony of Howes. The circumstantial evidence presented was strongly in favor of Cheatham, resulting in a decision favorable to the employee of this Department.

The interference case of *Conover and Gibbs v. Alfred Wohl* involved a United States patent issued to Conover and Gibbs, Department employees, covering a process for the manufacture of phthalic anhydride, phthalic acid, etc., and an application of Alfred Wohl, filed in Germany and later in the United States Patent Office.

The Court of Appeals held that while Conover and Gibbs had conceived the broad aspects of the invention prior to Wohl's filing of his amendment in Germany, in view of the absence of any documentary evidence substantiating their contention that they had conceived the invention, as covered by two of their patented claims, priority to these claims was awarded to Wohl, the court holding that Conover and Gibbs were entitled to claim 3 of their patent, which covered the broader terms of the invention (67 Fed. (2d) 908).

The interference of *Cotton and Young v. Schrader, et al.* involves the pending applications of the parties covering the use of a nonflammable insecticidal fumigant. A motion to dissolve by the party Cotton et al., Department employees, was granted by the examiner of interferences. Thereupon the party Schrader et al. took an appeal to the Board of Appeals of the Patent Office.

The interference of *Raymond Evans v. Peter Lohn and Alfonso Cortella*, involves the pending applications of the respective parties on an invention for recording sound on motion-picture film. This Office, on behalf of Evans, proposes to file a motion to dissolve the interference as to the party Lohn et al.

The interference case of *Arthur M. Henry v. Brogden & Trowbridge* was declared on March 27, 1929, between Arthur M. Henry, an employee of the Food and Drug Administration of this Department, and Messrs. Brogden and Trowbridge, employees of the Brogden Co., Ltd., of Los Angeles, Calif. Mr. Henry was the junior party, having filed in the United States Patent Office his application for letters patent through this Office on May 14, 1927, and a divisional application on April 19, 1928. The joint application of Brogden & Trowbridge was filed May 6, 1927, just 8 days prior to the filing of Henry's original application. Voluminous testimony and documentary evidence was submitted by both parties, and at a final hearing on June 30, 1931, oral arguments were made and briefs submitted.

On November 21, 1931, the examiner of interferences awarded priority of invention to Mr. Henry, the junior party, holding that he had proved reduction to practice prior to conception of the invention by the senior party, Brogden & Trowbridge. The senior party thereupon noted an appeal, which was on June 28, 1932, argued before the Board of Appeals of the United States Patent Office upon printed briefs filed by the parties, and on July 25, 1932, the Board of Appeals granted a decision favorable to Mr. Henry, affirming the decision of the examiner of interferences. From this decision the senior party, Brogden & Trowbridge, on October 21, 1932, noted an appeal to the United States Court of Customs and Patent Appeals, which was on March 8, 1934, argued by counsel for the respective parties before this appellate tribunal. On April 16, 1934, the court affirmed the decision of the United States Patent Office.

The invention involves (1) a process for removing, particularly from fruits, arsenical deposits, by treating the fruit with a solution of free alkali and/or a dilute solution of an alkali and an acid and then removing the same from the fruit, and (2) a process for the removal of residual poisons from fruits and vegetables by subjecting the articles to a dilute solution of an alkali and a dilute solution of an acid. Considerable interest as to the outcome of this case has been manifested by the fruit industry throughout the United States;

not only are the growers of apples vitally interested, but brokers and packers as well.

The interference of *Charles W. Mann and Alexander G. Galloway v. James D. Huston* involves a patent issued to Mann and Galloway, Department employees, covering the process of precooling refrigerator cars by reverse circulation of air. Considerable testimony was taken on behalf of Mann et al, both in California and at Washington, D. C., and at a final hearing on February 2, 1932, the case was argued by counsel for the respective parties on briefs submitted. No decision has as yet been rendered.

The application of John F. Barghausen, an employee of the Department, involved in an interference proceeding with Harry Henry McKee, Swift & Co. assignee, was prosecuted ex parte during the past year, the interference having been dissolved in accordance with the views of this Office. A patent dedicated to the public has been issued in the name of Mr. Barghausen and covers the meat-marking device used by the Department in its meat-grading service.

PACKERS AND STOCKYARDS ACT, 1921

(42 Stat. 159)

During the year there were instituted 29 notices of inquiry as the basis of hearings, and 1 case was reopened. There were 9 cases pending at the beginning of the fiscal year; 30 were disposed of during that period and 9 are still pending. The subject matter of the formal dockets dealt with stockyard rates, commission rates, solvency, trade practices, bonds, and reparation. Orders based on these dockets resulted in the fixing of reasonable rates for the stockyards and commission men. In cases of solvency, the registrants were suspended for reasonable specified periods but were given the privilege of having the suspensions vacated upon a satisfactory showing of solvency. In the trade-practices and bond cases, cease and desist orders were issued, and in some of the bond cases there were also suspensions.

Attorneys of this Office appeared as counsel and acted as examiners in a number of hearings held during the year involving the reasonableness of rates and charges collected by stockyard operators for feed, yardage, and weighing by the market agencies for their services of buying and selling. Other hearings based upon violations of the act were likewise conducted by them. In all of these the evidence taken was carefully reviewed by the attorneys. Narratives of the testimony in many of the cases were made by them in connection with the Packers and Stockyards Division of the Bureau of Animal Industry. Oral arguments before the Secretary were made in a number of cases. Opinions, both written and oral, were furnished from time to time to the Chief of the Bureau of Animal Industry on various legal questions arising in connection with the enforcement of the act.

CASES OF INTEREST

In the suit filed by the Union Stock Yards Co. of Omaha to restrain the enforcement of the schedule of rates and charges fixed by the Department for feed, yardage, and weighing at the Omaha stockyards, the statutory court of three judges, in a decision recently handed down, sustained the Department in every detail. Perhaps the outstanding feature of the case is that the court accepted the estimate made by the Department's appraiser of the value of the used and useful land as \$1,429,722, against the estimates of \$5,900,632, \$7,171,087, \$7,577,919, and \$7,918,442 placed on the land (including that found not to be used and useful) by the witnesses for the stockyards company. The estimate of the Department's appraiser on all the land was \$1,741,416. Sustaining the Department, in refusing to allow any land for expansion, the court said the company's business was not expanding, that its present facilities were ample for its current business, and that no showing was made of the need of additional land now or presently. The court found that it was entirely reasonable for the Secretary to require the traders to pay one-half the yardage charges for the services rendered to them in connection with cattle which are purchased and resold to packers or others. It was considered immaterial that the Secretary did not undertake to arrive at differentiated costs for separate services rendered by the stockyards. The

character of the business was held to be such that it did not lend itself to a satisfactory cost analysis upon that basis.

On July 28, 1933, a statutory court of three Federal judges sitting in Kansas City, Mo., issued an order temporarily restraining enforcement of the rates and charges prescribed by the Secretary for market agencies buying and selling livestock on a commission basis at the stockyards there. The petitioners were required to set aside and account for a sum of money equal to the excess of the existing rates over those fixed by the Secretary in order to protect the interests of the shippers, in the event the Secretary's rates and charges are finally sustained. An attorney from this Office assisted the Department of Justice in the preparation of this case, which is still pending.

On April 19, 1934, a similar court temporarily restrained the enforcement of the rates and charges fixed for market agencies at Chicago. The impounding of the difference between the rates prescribed by the Secretary and those collected was required in this case also. Final argument on the merits of the case is to be made some time in September 1934.

A temporary injunction was also obtained by the St. Joseph Stock Yards Co. suspending the rates and charges fixed by the Secretary for that market.

In March 1934 argument was had before the United States Circuit Court of Appeals for the Second Circuit on application of the Trunz Pork Stores, Inc., a packer of Brooklyn, N. Y., to set aside an order of the Secretary requiring the packer to cease and desist from certain violations of title II of the act. With a very slight modification, the court sustained the order of the Secretary.

On May 3, 1934, argument was made before the United States Circuit Court of Appeals sitting in Wilmington, Del., upon application of the Wilmington Provision Co., Inc., a packer of Wilmington, Del., to set aside an order of the Secretary requiring the company to cease and desist from similar violations. The case was pending at the close of the year.

In December 1933 suits were entered in the United States District Court in Kentucky against F. M. Moore and E. W. Crain for failure to register as required by the Packers and Stockyards Act. Crain was fined \$25 and costs in March 1934 and in May the same penalty was assessed against Moore.

On February 14, 1934, the Secretary of Agriculture issued a complaint and notice of hearing against 12 packers, among them being Armour & Co., Swift & Co., the Cudahy Packing Co., and Wilson & Co., charging in substance that the various 12 respondents in Mississippi and Alabama and in divers other States, through their agents, had met and agreed as to prices and issued confidential price lists at which meat and meat food products were to be sold in commerce; that the packers had discriminated as to persons and territory, had manipulated prices in commerce, apportioned sales, and conspired to violate the Packers and Stockyards Act. Hearing was begun in this case on May 17, at Jackson, Miss., and moved to Birmingham, Ala., where the hearing was in process at the close of the fiscal year.

PERISHABLE AGRICULTURAL COMMODITIES ACT

(46 Stat. 531)

The Perishable Agricultural Commodities Act was amended by an act approved April 13, 1934, by the addition of several provisions which make its enforcement more effective. Important among these is the provision for the automatic suspension of the license of any dealer who fails to pay a reparation award within the time allowed in the order, or to appeal the matter to a Federal court. Another provision makes the issuance of a license dependent upon the past conduct of the applicant and authorizes proceedings to revoke the license of one (1) who retains in a responsible position any person whose license has been revoked or (2) who obtained the license by fraud. The authority to dispose of complaints involving \$500 or less upon depositions and sworn statements of fact will save considerable time and expense and expedite the disposition of cases.

A total of 319 formal decisions were rendered by the Secretary during the year, and formal hearings were held in 190 of the 319 cases. Revocation of respondent's license was ordered in 8 cases, and suspension of license was ordered in 3 cases. The holding of hearings and assistance in the preparation of decisions, findings of fact, and orders, and all other work of a legal nature is performed by attorneys in this office.

CASES OF INTEREST

In *Barker-Miller Distributing Co. v. Barney Berman*, Judge Knight, of the United States District Court for the Western District of New York, sustained an order of the Secretary awarding reparation in the sum of \$556.23. The order was attacked on the grounds that the Secretary did not have jurisdiction and that it was contrary to the weight of the evidence. The court accepted the Secretary's conclusion as to jurisdiction, and held that the prima facie case made out by the order would prevail, unless overcome by evidence submitted by the plaintiff, and that there was no evidence before the court to justify modification of the order.

An attack upon the constitutionality of the act was made in a suit filed in the Federal court at Chicago by Abe Rafelson, Inc., against the Secretary. The Rafelson company having failed to pay a reparation award within the time allowed by the order or to appeal the case to the court, its license was automatically suspended because of a provision to that effect in the act. An injunction was sought to restrain the administrative officers from taking action against the company for doing business without a license. By stipulation of the parties, the company is allowed to continue in business pending final disposition of the suit on its merits. This made it unnecessary for the court to grant a temporary injunction.

In another suit filed in the Federal court at Chicago, Andrew Cuttone & Son is seeking an injunction against the publication of the facts as ordered by the Secretary in connection with a complaint filed against the company under the act.

UNITED STATES WAREHOUSE ACT

(39 Stat. 486)

Advice and assistance were given to the administrative officers on questions arising in connection with the administration of the United States Warehouse Act.

CASES OF INTEREST

In *Federal Compress Co. v. McLean* (291 U. S. 1) it was held that a license under the Warehouse Act did not relieve the warehouseman from the necessity of obtaining also a license under the Mississippi law. The cotton stored in the warehouse was produced within the State and from there shipped to a warehouse at Cleveland, Miss., a concentration point for storage purposes, pending final disposition. When shipped from Cleveland, it was entitled, under the contract with the carrier, to the benefit of a through rate from the original shipping point to ultimate destination. The court said that, notwithstanding the fact that most of the cotton grown in the State moves out ultimately in interstate and foreign commerce, it does not begin its interstate movement until it is taken from the warehouse for shipment to a destination outside the State, so that the State is not interfering with interstate commerce by requiring the license. A license under the United States Warehouse Act does not, the court said, make the warehouse a Federal instrumentality. The court recognized the validity of the Federal statute, saying that it secures to the Federal Government a certain measure of control over its licensees and that such control is exercised in the furtherance of a governmental purpose to secure fair and uniform practices.

In *Chassaniol v. Greenwood* (291 U. S. 584) the court sustained an ordinance of Greenwood, Miss., levying a tax upon every person engaged in the business of buying or selling cotton for himself. Chassaniol, one of 25 cotton buyers in the city, paid \$50 a year under protest. He applied for a refund, which was refused. The court, following its decision in the previous case, held that Chassaniol was not engaged in interstate commerce and was therefore subject to a local tax.

PRODUCE AGENCY ACT

(44 Stat. 1355)

John Mitseff of Akron, Ohio, was sentenced by Federal Judge West, on May 24, to imprisonment for 3 months at Milan, Mich., and to pay a fine of \$1,000, for failure to render correct accounting and to pay the net proceeds on a con-

siderable number of consignments of vegetables handled for growers in Mississippi.

William D. Salem and Thomas V. McKeever, of the firm of Albert M. Travis Co., of Pittsburgh, Pa., were fined \$100 each by Federal Judge Gibson for failure to pay in full the net proceeds of vegetables handled on consignment for growers in Alabama, Louisiana, New York, Virginia, Michigan, and North Carolina. The judge, in imposing the fine, took into consideration the long period during which the company had been in business and the present financial standing of the parties.

In a case against Depp-Badali Produce Co., of Pittsburgh, Pa., each of the four officers of the firm was fined \$100 by Judge Gibson for failure to remit the net proceeds of produce handled on consignment. In this case, also, the judge took into consideration the long period the firm had been in business and the present financial condition of the business.

A sentence of 3 months' imprisonment and an order to make restitution to the shippers were imposed by Federal Judge Welch, of Philadelphia, in the cases against Joseph Hoffman, Benjamin Rotter, and Fred A. Wright. The judge severely reprimanded the defendants and refused to suspend any of the sentences.

In the case against Benjamin F. Wheatman, upon a plea of *nolo contendere*, the defendant was sentenced by the court to make restitution of \$539.86 to the shipper and was put on probation for 1 year.

The circuit court of appeals at San Francisco in *Cochran v. Esola* (67 Fed. (2d) 91), held that one is engaged in interstate commerce within the Produce Agency Act when he receives apples in bulk at his packing house, packs them, and then ships them out of the State to different markets in the United States. The fact that some of the apples might be sold in the State where they were packed was held not to detract from the interstate character of the transaction.

EXPORT APPLE AND PEAR ACT OF JULY 10, 1933

(48 Stat. 123)

In the first case prosecuted under this act, the defendant, Harold K. Miller, general manager of the Miller Fruit Co., Inc., of Healdsburg, Calif., pleaded guilty to a criminal information charging him with having shipped on the vessel *Pacific Pioneer* of the Furness Line, 333 boxes of apples consigned to London, Eng., which were not accompanied by a certificate issued under authority of the Secretary of Agriculture showing that the apples were of a Federal or State grade meeting the minimum of quality established by the Secretary for shipment and export, and the requirements other than those fixed by the regulations. Miller was fined \$100.

UNITED STATES GRAIN STANDARDS ACT

(39 Stat. 478)

The Chief of the Bureau of Agricultural Economics was advised that although grain shipped by boat through the Great Lakes to Albany, Buffalo, and Ogdensburg, N. Y., had been inspected at shipping point and a certificate had been issued showing its grade, such certificate, being for the average of a large mass of several grades of grain, could not be used as the basis for the so-called "split certificates", when the grain was loaded out of the elevators into which it had been transferred for shipment in carload lots to other points. The loading of the grain into the car, for further transportation, constitutes a new shipment requiring inspection and certification because the smaller load might not be of the average grade assigned to the boatload.

A hearing against the individual members of the Minnesota Board of Grain Appeals, who were licensed inspectors under the United States Grain Standards Act, on charges that they knowingly and carelessly misgraded grain, was conducted at Minneapolis by an examiner and attorney from this Office. The case was vigorously contested and attracted considerable attention. The licenses of the three members of the board were revoked.

THE GRAIN FUTURES ACT

(42 Stat. 998)

In the proceedings against the Chicago Board of Trade on the complaint of the Farmers National Grain Corporation that the board had denied it membership in the Board of Trade Clearing Corporation, the board appealed to the Circuit Court of Appeals at Chicago from the order of the Grain Futures Commission suspending its designation as a "contract market." The court, in an opinion of October 31, 1933 (67 Fed. (2d) 402), upheld the order of the Commission on every point, except the question whether the Farmers National had handled a volume of grain for nonmembers in excess of that handled for members. The evidence was considered insufficient for the determination of that question, and the case was therefore remanded to the Commission for the taking of further evidence. The board urged that the act is unconstitutional on the ground that the provision for suspension or revocation of the "contract market" designation is contrary to the due-process clause of the Constitution and the requirement of a jury trial. The court saw nothing of a criminal nature in a proceeding for the revocation of a license or permit or designation granted under authority of the statute. In holding that it was no denial of due process, the court referred to and adopted the opinion of the statutory court of three judges in *Farmers Livestock Commission Co. v. United States* (54 Fed. (2d) 375), involving a suspension of registration under the Packers and Stockyards Act, 1921, in which it was held that the proceedings authorized by that act, which are similar to those provided in the Grain Futures Act, constituted due process of law.

A hearing on a complaint by the Secretary of Agriculture charging that Ettinger and Brand, members of the Chicago Board of Trade, had failed to keep records of their dealings on the board, had concealed their transactions, and had made false reports in violation of the Grain Futures Act, was held at Cleveland, Ohio, in January. Final action has not yet been taken on the matter.

A hearing was held at Chicago, in May, charging Arthur W. Cutten, one of the largest operators on the Chicago Board of Trade, with concealing his transactions, keeping or causing the keeping of false records of his dealings, and manipulating the price of grain contrary to the Grain Futures Act. The case is still pending, awaiting briefs of counsel.

FARM PRODUCTS INSPECTION LAW

(Annual appropriation acts)

In a criminal prosecution against H. S. Kuramoto, in the Western District of Washington, for the alleged alteration of a certificate issued under the act, the judge sustained the defendant's demurrer to the indictment on the ground that it did not allege interstate shipment. Upon consideration of the matter, the Solicitor General decided to have the defendant reindicted rather than prosecute an appeal because of the difficulty in making the necessary jurisdictional averments in view of the court's not having filed a written opinion in the matter.

Amendments to regulations under this law were examined as to their legal sufficiency.

UNITED STATES COTTON STANDARDS ACT

(42 Stat. 1517)

Approval as to its legal sufficiency was given to a regulation for carrying out the purposes of the amendment of March 4, 1933 (47 Stat. 1621), providing for the issuance of licenses to persons qualified to act as cotton samplers. Various other amendments to the regulations were examined and approved.

Several cases involving the suspension of licenses given to cotton classifiers because of irregularities in their work were reviewed and approved.

UNITED STATES COTTON FUTURES ACT

(39 Stat. 483)

A number of amendments to the regulations for carrying out the provisions of the Cotton Futures Act were approved as to their legal sufficiency.

UNITED STATES STANDARD CONTAINER ACT OF 1916

(39 Stat. 673)

The prosecution against the Yates Lumber Co. for the use of a mushroom carton not conforming to the requirements of the Standard Container Act was dismissed upon the recommendation of the Department because of an amendment to the act, approved June 11, 1934 (Public, No. 306), making such cartons lawful.

UNITED STATES STANDARD CONTAINER ACT OF 1928

(45 Stat. 685)

In the case against the Jersey Package Co., involving a violation of the Standard Container Act of 1928, the jury rendered a verdict of guilty, and the court imposed a fine of \$50.

The work of the Office, considering its nature, was current at the end of the year.

REPORT OF THE CHIEF OF THE WEATHER BUREAU, 1934

UNITED STATES DEPARTMENT OF AGRICULTURE,
WEATHER BUREAU,
Washington, D.C., September 11, 1934.

SIR: I submit herewith a report of the work of the Weather Bureau during the fiscal year ended June 30, 1934.

Respectfully,

W. R. GREGG, *Chief.*

HON. HENRY A. WALLACE,
Secretary of Agriculture.

The Weather Bureau is authorized by its organic act to serve a wide variety of interests, including agriculture, commerce, and marine and aerial navigation. This service is provided in part through cooperation with other departments, both civil and military, and with various bureaus of the Department of Agriculture. For example, its forecast work in the protection of forests from fires is carried out in cooperation with the Forest Service, its marine work with the Hydrographic Office, Navy Department, and its service in aid of flying activities with the Bureau of Air Commerce, Department of Commerce. Weather is so intimately related to the welfare and happiness of all classes of people that the most effective service can be attained only by working closely with all other agencies, both governmental and nongovernmental, with which cooperation is possible. During the past year a definite beginning has been made in the development of this policy.

ADOPTION OF PROGRAM RECOMMENDED BY THE SCIENCE ADVISORY BOARD

It has been recognized for some time that there was need of a broader, more open-minded viewpoint regarding the utilization of results of the more recent studies and investigations in forecasting. This feeling found expression during the past year in a report submitted by a committee of the Science Advisory Board, the latter having been created by the President on July 31, 1933, for the purpose of cooperating with the Federal Government in the handling of all problems in which science is involved.

The membership of the special committee on the Weather Bureau was as follows: Robert A. Millikan, director, Norman Bridge Laboratory of Physics, and chairman of the executive council, California Institute of Technology, Pasadena, Calif., chairman, Isaiah Bowman, chairman, National Research Council, director, American Geographical Society, New York City, Karl T. Compton, president, Massachusetts Institute of Technology, Cambridge, Mass., and Charles D. Reed, senior meteorologist in charge, Weather Bureau section center, Des Moines, Iowa.

The committee's report was published in December 1933, was approved in January 1934, and action to carry out its recommendations has been proceeding since that time.

The most important recommendation is that relating to the development of forecasting on the basis of what is known as "air-mass analysis." Briefly stated, air-mass analysis consists of a detailed study of masses of air of decidedly different structure as to temperature, moisture, and wind that meet along an

irregular line variously referred to as a "discontinuity line", "polar front", "wind shift", etc. These masses of air, cold and dry from polar regions, warm and humid from equatorial, do not readily mix but tend to preserve their individual identities, the warm, moist air being forced to rise above and flow over the denser cold air, with resulting condensation and precipitation and other attendant phenomena which give us most of the stormy weather characteristic of temperate latitudes.

The chief requisites for the application of air-mass analysis to forecasting are (1) personnel qualified by training and experience in this school of thought; (2) daily reports of temperature, humidity, and other conditions up to 3 or 4 miles above the earth's surface at a large number of places well distributed over the country; and (3) more frequent and more detailed reports of surface conditions, including observations at sea.

In carrying out the first objective a special nonassembled civil-service examination has been announced for the purpose of bringing into the Bureau several well-qualified men who have specialized in forecasting based on air-mass analysis. The introduction of this method will require probably from 3 to 5 years, during which period the personnel of the Bureau, already experienced in forecasting, will be given additional training along the newer lines.

The second part of the program, namely, securing upper-air observations of temperature, humidity, etc., has been put into effect to the extent that this is possible at the present time. This has been accomplished through cooperation with the War and Navy Departments. In all, 20 airplane stations are now in operation, 7 operated by each of these Departments and 6 by the Weather Bureau. They are quite well distributed over the country. Daily flights are made to heights of about 17,000 feet, and the data are at once transmitted by the teletype system of the Bureau of Air Commerce. The organization of this network of upper-air stations constitutes the most important step in the development of the air-mass analysis program. The data will be of great value in theoretical studies as well as in the more practical work of forecasting.

Under existing conditions not much can be done in putting into effect the third objective, namely, securing more frequent and more detailed observations of surface conditions, both on land and at sea. However, a definite program has been worked out for adoption as soon as practicable. It provides for 4 daily weather maps instead of 2 and for more precise information regarding cloud types, character of precipitation, pressure changes, and other elements. The data will be reported in accordance with a system of codes and units that has been adopted for international use, thus assuring comparable reports from all countries.

Generally speaking there has been comparatively little progress in forecasting for many years. It is confidently believed that, through the greater employment of modern working tools such as radio and the airplane which will give essential data in the vertical as well as in the horizontal, we now stand on the threshold of an era of real progress, providing forecasts more accurate and more specific and covering somewhat greater periods in advance than have been possible up to the present time.

COMPILATION OF METEOROLOGICAL DATA

An important accomplishment during the year just ended was the compilation of meteorological data under the Civil Works Administration program. For many years data have accumulated but, owing to lack of personnel, have been summarized only in part. This important work has now been brought more nearly up to date, with the result that a great body of statistical data is now available which is of great value in such studies as those designed to establish cycles or correlations that may possibly be used as bases for longer period forecasts than are now justified. In addition, the data are very useful in furnishing information concerning conditions that prevailed at various times in different parts of this country and its possessions, in the upper air and at sea. Included in this project are the data secured during the International Polar Year. These data, together with those from all other countries that participated in the program, are being entered on Northern Hemisphere maps, which will thus show on a larger scale than has heretofore been possible the progressive changes that occur in weather conditions from day to day and from month to month. Important conclusions are expected from studies of these charts.

The data that have been compiled and classified from ocean weather observations provide information for certain areas where hitherto little has been known concerning climatic conditions, particularly those regions in which hurricanes and other tropical storms have their genesis. The relation of weather to sea-surface temperatures is also receiving attention as a result of this activity.

AEROLOGY

Airplane weather observations were made under contract with commercial operators at four stations during the year. Heights of 17,000 feet were reached in practically all cases, and flights were made nearly every day at all stations. Considerable progress has been made in increasing the accuracy of the data by improving the recording instruments (aerometeorographs) and the method of calibration. The data have been found to be of increasing value in the forecasting work of the Bureau and in providing a better understanding of the mechanics of the atmosphere.

A total of 46 sounding balloons was released from the Weather Bureau airport station, Omaha, Nebr., during January, the international month for 1934. Forty-four (96 percent) of the attached meteorographs have been found and returned. These records are being computed and will be published by the International Commission for the Exploration of the Upper Air.

Measurement of upper-air wind currents by means of pilot balloons was maintained at 75 stations, including 3 in Alaska and 1 in San Juan, P. R. Two to four observations were made daily, weather permitting, at each station to an average altitude of 12,000 to 15,000 feet. These observations provide valuable information for current use by forecasters and air-transport companies and also for studies of the general circulation of the atmosphere.

Good progress was made in the preparation of a summary of average upper-air wind conditions over the United States, based on the records of pilot-balloon stations having a record of 3 years or more. One section of the summary covering the eastern section of the country has been published.

SERVICE IN AID OF AIR NAVIGATION

On account of a reduction in appropriations available for the fiscal year, it was necessary to carry on the weather service over the civil airways on an amount approximately \$250,000 less than that for the previous year. Consequently, no extensions of service were possible, but service was continued on approximately 25,000 miles of existing airways without material curtailment. This was accomplished by reducing personnel and other expenses and by utilizing the services of Department of Commerce radio operators for the taking of surface observations wherever possible. The latter arrangement was made possible through a cooperative agreement with the Department of Commerce and the fact that a system of remote control of the radio stations from the airports had been developed and placed in use at many points. The supervision of all weather service performed by the Department of Commerce employees rests with the Weather Bureau.

Material progress in the stabilizing of the service along administrative, forecasting, and observational lines has been made, and further work in this direction is now going forward.

RIVER AND FLOOD SERVICE

At the opening of the year strenuous efforts were being made to reduce the cost of the service and bring it within the limit of available funds. Although the river and flood work had been undergoing a process of paring for several years, and some important features had been discontinued to meet the necessities, further and rather drastic reductions were made in July 1933. However, through the aid of an analysis of the organization made just prior to the last retrenchment, suspensions of service were confined to the parts that might be called the least essential. Because of the extremely dry weather that has prevailed for a year or more there have been no floods of a general nature, and the decrease in the number of stations has not been felt in a serious way, except that the loss of records is bound to be felt by those who use Weather Bureau data in studies on the relation of stream flow to precipitation.

On June 30, 1934, reports from 709 river gages were available to the Weather Bureau. Of this number 626 were read by the Bureau, and 83 were read for the Bureau by other agencies, principally the Engineer Corps of the Army. Many of the reports (98) are available only in times of threatened or actual floods; 482 are available daily throughout the year, and 129 are available daily in the months that may be said to constitute the flood season.

Despite the dry weather there were some local floods, and some of them were quite severe. The total damage has been estimated at \$20,000,000, and the value of property saved by warnings issued by the Weather Bureau has been estimated to amount to \$4,000,000.

The Weather Bureau has always worked under disadvantages in its river and flood service; outstanding among these handicaps was the unstable nature of the river gages, which in most instances were of a temporary type, difficult to hold in adjustment. In September 1933 the Public Works Administration gave the Bureau an allotment of \$150,000 for replacing river gages with structures of a substantial and modern type. Work under this allotment has progressed actively, and by June 30, 1934, the following river gages had been erected:

Type of gage:	Number erected
Staff-----	76
Weighted chain-----	9
Weighted wire-----	97
Recording-----	47
Total-----	229

The work is 80 percent complete, and will be brought to a close in December 1934.

The new network of gages will enable the Weather Bureau to improve its stage and flood forecasts, largely through the adoption of the rating-curve method made possible by the erection of recording gages, but another highly important advantage that will be gained through the erection of recording gages will be the opportunity to collect data from which the relation between stream flow and precipitation can be determined. A knowledge of this relation is necessary in planning for power dams, irrigation projects, flood protection and prevention, and farm and city water supplies. However, reliable statistics regarding the relation are too scanty to be of great value, and the dry weather that has prevailed over most of the country has shown engineers in a most positive way that sound plans for water conservation, so necessary to agriculture and the general economic life of the country, cannot be made without a definite knowledge of the volume of water that streams may be expected to deliver in long periods of insufficient rain.

In large parts of those States comprising the Rocky Mountain country the water required for agriculture, for mining, and for towns and cities comes from mountain snowfall. The Weather Bureau maintains as a part of the river and flood work a service devoted to the collection of information of the amount and consistency of snow in the mountain snow fields—snow that is depended upon to give the major part of stream flow until some time in the summer. This service has been valuable throughout its existence of about 25 years, but the increased development of water conservation, which will result in a decrease of waste in times of flood and a greater possible use later in the season, makes it imperative that this service be coordinated to a greater extent with the needs and activities of water users, and a study of the necessities, and the action that is practicable, is now being made.

THE 1934 DROUGHT

Widespread severe drought during the crop-growing season of 1934 adversely affected the principal grazing and grain-producing areas of the country to an unprecedented extent. However, there is nothing to indicate that the 1934 drought in the Midwestern States constitutes a permanent change to desertlike conditions. There have been great climatic changes in geologic times. That is, large areas of the United States have moisture conditions at present very unlike those prevailing a great many centuries ago, but certainly no marked permanent change in climate has taken place within the last few years. On the contrary, the longest available rainfall records indicate that the 1934 drought in these areas is but what may naturally be expected to occur at comparatively

long intervals of 30 to 40 years, notwithstanding the present drought is more severe and covers larger areas than any other of which there is a record.

The 1934 drought differed from that of 1930 in several respects. It began in the early spring, while in 1930 critical conditions did not develop in most affected sections until about midsummer. Also it was first severely felt in the Northwest, from which it spread rapidly to many other areas, while in 1930 the spread was westward from the Central Eastern States. In addition the areas affected in 1934 were much more extensive than in 1930.

It is characteristic of precipitation records, in the long run, to vary in wave-like progression. When short-period fluctuations in the records are smoothed there appear successive up-and-down trends, merging, more or less regularly, one into the other and covering comparatively long periods. In general, the difference in the rainfall for the periods of comparatively heavy and those of lighter amounts is marked, and the trends are rather uniform in progress from maximum to minimum and vice versa. However, the time phase, or number of years from maximum to minimum and return to maximum, appears decidedly irregular and without apparent conformity to any law of succession.

Precipitation records for the States east of the Rocky Mountains show a well-marked tendency during the past quarter of a century to decreasing amounts, or lighter rainfall, in much of the North, especially the Northwest, and, until recently, to heavier rains in the South. In most cases in the South and East the trends have changed to downward in recent years.

In the northwestern area the last maximum appears for the 10 years up to about 1908, or around 25 years ago. Since then, there has been a rather regular decrease, as shown by a 10-year moving average, to the present time. In Minnesota, for example, the average precipitation for the 10 years ended with 1908 was approximately 29.5 inches, and for the decade ended with 1933 just a little more than 23 inches. In other words, the former 10-year period had nearly 30 percent more rainfall than the latter. A falling off in precipitation of such magnitude is especially important in a region like this, where the amount normally is rather small. This long-time northwestern decline in precipitation has centered in Minnesota, but covers the northern Plains to the west, especially the Dakotas, and extends to the western Lake region on the east.

About midway between these long-interval depressions in rainfall curves appear series of successive years with comparatively abundant rains, and there is nothing at this time to indicate that history, in this respect, will not repeat itself with a return to another temporary period, not now predictable, when much heavier rains will again be the order of the day. A long record at St. Paul, Minn., covering about 100 years, shows two previous depressions, rather similar to the present, at 30- to 40-year intervals.

The first covered the 10 years ended with 1848 and the second the decade ended with 1894. After each of these there was a marked recovery, with the peaks of the curves appearing in 1874 and 1908, respectively. The amplitude of these swings, or the difference between the averages for the periods of heavier and lighter rainfall, on a 10-year average-rainfall basis, is from about 24 inches minimum to 32 inches maximum. That is, on an average, the wet periods have about one-third more rain than the dry periods.

Long records for other sections of the country show similar trends, but they are not in agreement, one with the other, in regard to the time phases of the trends. For example, the Washington, D. C., record, beginning with 1817, shows a minimum for the 10 years ended with 1831 of 32.2 inches. Thereafter, there was a somewhat irregular, but very definite, rise to 48.2 inches for the decade ended in 1891. Since then the trend has been downward, but not uniformly, to 39.8 inches for the decade ended with 1933. Here we have a difference in the 10-year average of rainfall up to 1831 and the 10-year average ended with 1891 of 16 inches, or about 40 percent. The decrease since the maximum in 1891, or during the last 42 years, has been 8.4 inches.

The Washington record differs from that at St. Paul, Minn., representing northwestern conditions, in that, for the past century, only 1 maximum is shown in the Washington record and 2 in the St. Paul record. Also in the Washington record there is a 60-year interval between the minimum in 1831 and the maximum in 1891, which is much longer than any single trend at St. Paul. Still further, the Washington maximum in 1891 coincides, approximately, with the St. Paul minimum in 1894. In other words the trends for different areas are frequently in opposition instead of agreement. A compari-

son of records at other long-record stations shows a similar lack of agreement in this respect.

While the trend in precipitation in the Northwest has been downward for a good many years, the present deficiencies in the central valley States, in general, began with June 1933. Table 1 shows the total rainfall by States from June 1933 to July 1934, inclusive, and the percentage of normal, for this 14-month period.

TABLE 1.—Average State rainfall and percentage of normal for the 14-month period June 1933–July 1934

State	Total rainfall	Percent- age of normal	State	Total rainfall	Percent- age of normal
	<i>Inches</i>	<i>Percent</i>		<i>Inches</i>	<i>Percent</i>
Alabama.....	56.49	90	Nevada.....	6.34	66
Arizona.....	11.85	81	New England.....	50.52	104
Arkansas.....	48.77	87	New Jersey.....	52.84	98
California.....	16.54	69	New Mexico.....	15.31	83
Colorado.....	15.49	76	New York.....	41.76	90
Florida.....	74.06	111	North Carolina.....	52.56	88
Georgia.....	53.38	89	North Dakota.....	13.13	57
Idaho.....	17.50	90	Ohio.....	32.52	71
Illinois.....	28.82	64	Oklahoma.....	31.14	78
Indiana.....	31.58	68	Oregon.....	24.79	93
Iowa.....	26.81	67	Pennsylvania.....	45.48	89
Kansas.....	24.21	71	South Carolina.....	48.97	84
Kentucky.....	46.14	86	South Dakota.....	16.10	61
Louisiana.....	63.85	96	Tennessee.....	53.38	91
Maryland and Delaware.....	51.99	106	Texas.....	31.33	85
Michigan.....	28.42	78	Utah.....	8.84	61
Minnesota.....	22.54	69	Virginia.....	45.93	91
Mississippi.....	52.65	84	Washington.....	46.64	126
Missouri.....	30.97	63	West Virginia.....	46.34	89
Montana.....	16.85	87	Wisconsin.....	28.00	74
Nebraska.....	19.44	63	Wyoming.....	11.94	69

As previously mentioned, the 1934 drought became established to such an extent as seriously to affect agriculture first in the Northwest, early in the spring, centering in eastern Montana, the Dakotas, and Minnesota. From this area there was a rapid spread southeastward, southward, and southwestward, so that by the end of May it had become the most extensive drought in the climatological history of the United States. In general, by that date the drought was severe throughout the Ohio and central and upper Mississippi Valleys, the central and northern plains, most Rocky Mountain sections, and the Great Basin of the West, covering approximately three-fourths of the country.

The 1934 spring season, March to May, inclusive, was the driest of record in both the Dakotas, Minnesota, Nebraska, Iowa, and Illinois; and the second driest of record in Ohio, Indiana, Wisconsin, Missouri, and Kansas. In Illinois, for example, the total rainfall for the 3 months was only 4.21 inches; the previous low record, 6.06 inches, was more than 40 percent greater than this. In Minnesota the previous low spring record, 3.39 inches, was more than 20 percent greater than the 2.79 inches that fell in the spring of 1934. North Dakota had only 1.27 inches of rain during the 3 months; the previous low record, 2.15 inches in 1901, was nearly 70 percent greater.

Extremely high temperatures during May in the interior valleys and the Northwest intensified the effects of the scanty rainfall; over considerable sections it was the warmest May ever known. For example, at Des Moines, Iowa, the average May temperature of 71° F. was not only the highest of record, but equaled the June normal. In the northern plains the averages for most stations were higher than the normal for June. Huron, S. Dak., had a May average of 70°, which was 4° higher than the June normal, while the Rapid City mean of 67° was 3° higher than the normal for June. Throughout this northwestern section it was not uncommon for maximum temperatures to range from 100° to 104° for several days in succession. Dust storms were numerous and damaging.

At the end of May small grains, hay, pastures, and other feed crops had suffered severely and were deteriorating at a rapid rate. However, June

brought material relief over large areas, as much more rain occurred than theretofore over most of the severely droughty sections. Precipitation in June was only slightly below normal in the Ohio Valley, ranging from about three-fourths of normal in Illinois to somewhat above normal in Kentucky, while much of the central-northern area had from 90 to 98 percent of normal. However, in the Southwest there was a corresponding diminution in rainfall, with June hot and dry in many sections. The dryness centered in Texas, which had less than one-fourth of its normal rainfall, while both New Mexico and Arizona had less than half of normal. At the same time, an area in the central-north, centering in eastern Montana, had no relief, and parts of the Northeast, especially northern and western New York, needed rain badly.

With the advent of July, conditions became rapidly worse in many Central, Southwestern, and Western States, where the effect of the scanty rainfall was aggravated by the persistence of extremely high, often record-breaking, temperatures.

In the Ohio Valley and parts of the upper Mississippi Valley earlier rains had supplied soil moisture sufficient to enable vegetation to withstand the excessive temperatures rather well, and in a few areas the growth of cultivated crops continued excellent. In places the dividing line between favorable and unfavorable conditions was very sharply drawn. An outstanding case is that of Iowa. Conditions in the northern part of the State were generally favorable, with pastures improving rapidly, minor crops doing well, and corn in good to excellent condition, while in the southern portion the situation became serious, with hope for winter feed nearly gone, water supplies exhausted, and no prospect of corn for grain.

At the close of July, conditions in southern Iowa were typical of those in most other sections between the Mississippi River and Rocky Mountains where all crops, except cotton in the southern portion, showed extremely rapid deterioration, with pastures practically gone, the water situation serious, and even trees dying in sections of the Great Plains.

In the Southeastern States, extending from central Virginia to Alabama, and including much of Kentucky and Tennessee, generally good growing conditions continued through July, but considerable portions of the Northeast and Middle Atlantic area, including New England, much of New York, Maryland, and northern and western Virginia, became decidedly dry.

The first half of August brought very helpful showers to most of the Ohio Valley area, and the last half of the month the weather was much cooler, with substantial to heavy rains, in much of the Southwest, especially Oklahoma and Missouri. In addition, during the first few days of September widespread generous rains effectively relieved droughty conditions, at least temporarily, over a large midwestern and southwestern area extending from southern Minnesota and Nebraska southward over the western winter Wheat Belt. The rains were especially timely in conditioning the soil for seeding winter wheat over the most important sections of the belt.

The summer of 1934 was by far the hottest of record over a large midwest area, the excess above normal temperature in many places being nearly twice as great as that for the previous warmest summer of record. At Columbia, Mo., the average maximum temperature for July was 100° F.; at Oklahoma City, Okla., 100°; Topeka, Kans., 102°; and Fort Smith, Ark., 102°. For the summer months (June-August) Des Moines, Iowa, had 22 days with maximum temperatures 100° or higher; Columbia, Mo., 34 days; Topeka, Kans., 47; Oklahoma City, Okla., 45; and Fort Smith, Ark., 53. Nothing remotely approaching this for sustained heat has been experienced in any State east of the Rocky Mountains since weather records began.

In addition to the serious drought situation over the great western grazing areas and the central grain sections, the scarcity of snow in the western mountains during the preceding winter created a serious situation in the matter of water supply for spring and summer irrigation in many western sections where irrigation is practiced. For example, the seasonal snowfall up to the end of March in California was less than half the normal; in Wyoming there was but little more than a third as much as in the preceding year; Colorado had about half of normal, and in New Mexico, at the close of March, only drifts remained in the northern slopes at the higher elevations, in the northern part of the State.

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1934

AGRICULTURAL ADJUSTMENT IN 1934

A REPORT OF ADMINISTRATION OF THE
AGRICULTURAL ADJUSTMENT ACT
FEBRUARY 15, 1934, TO DECEMBER 31, 1934



UNITED STATES
DEPARTMENT OF AGRICULTURE
AGRICULTURAL ADJUSTMENT ADMINISTRATION

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UNITED STATES
GOVERNMENT PRINTING OFFICE
WASHINGTON : 1935

LETTER OF TRANSMITTAL

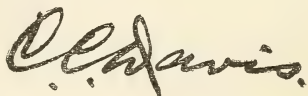
UNITED STATES DEPARTMENT OF AGRICULTURE,
AGRICULTURAL ADJUSTMENT ADMINISTRATION,
Washington, D. C., March 9, 1935.

Hon. HENRY A. WALLACE,
Secretary of Agriculture.

DEAR MR. SECRETARY: Herewith is transmitted the second report of efforts to assist in the recovery of agriculture, undertaken in compliance with the mandate of Congress contained in the Agricultural Adjustment Act.

The report covers the activities of the Agricultural Adjustment Administration from February 15, 1934, through December 31, 1934. It supplements and is a continuation of the first report, which was dated February 15, 1934.

Respectfully,

A handwritten signature in dark ink, appearing to read "C. C. Davis". The signature is fluid and cursive, with the first and last names clearly legible.

Administrator.

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FOREWORD

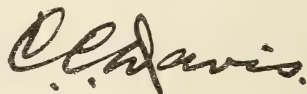
When the first report of the Agricultural Adjustment Administration was made 1 year ago, the adjustment program had been in operation approximately 9 months. Production-adjustment measures had been launched for several of the major farm commodities, but at that time the effects of the program had only begun to be felt.

During the year 1934, the programs have been extended to include more than 3 million farmers as signers of adjustment contracts and several hundred thousand others working through marketing agreements and licenses. The number of farmers participating constitutes considerably more than half of all the farmers in the United States, and a still larger fraction of the number raising or marketing enough farm produce to be interested in participating.

The year 1934 also has brought tangible results in the way of increased farm income. The total cash income of farmers for the year, according to estimates of the Bureau of Agricultural Economics, is approximately \$6,100,000,000, as compared with \$5,051,000,000 for 1933 and \$4,328,000,000 for 1932.

The great drought which spread over a large part of the United States was a dominant factor in the situation during the year, and brought out the flexibility of the adjustment program. While the drought contributed materially to raising farm prices and was the principal cause of the shortage of meat products developing at the beginning of 1935, it left many farmers in a desperate plight. Their situation has been ameliorated somewhat by benefit payments, which served as crop income insurance, by the Government's cattle-buying program, and other emergency measures.

With accumulated surpluses of some farm commodities largely eliminated by the drought, agriculture's problem now is to carry forward a controlled expansion in step with increasing domestic and foreign demand, and to consolidate the economic gains already made.



Administrator, Agricultural Adjustment Act.

AGRICULTURAL ADJUSTMENT IN 1934

CHAPTER 1

THE ECONOMIC POSITION OF AGRICULTURE

SALIENT FACTS ABOUT THE ECONOMIC POSITION OF AGRICULTURE

1. Farm cash income:	
1929-----	\$10, 479, 000, 000
1932-----	\$4, 328, 000, 000
1933-----	\$5, 051, 000, 000
1934-----	\$6, 100, 000, 000
2. Percent increase in cash income, 1934 over 1932-----	41
3. Percentage of rental and benefit payments to farm cash income:	
1933-----	2. 6
1934-----	7. 3
4. Index of average farm prices (pre-war 100):	
In December 1933-----	78
In December 1934-----	101
5. Percent farm prices were of parity:	
December 1933-----	67
December 1934-----	80
6. Number of production-control contracts in effect:	
At close of 1933-----	1, 925, 000
At close of 1934-----	3, 699, 000
7. Percent of total farm cash income in 1933 contributed by commodities now covered by production-control programs-----	49. 9
8. Number of marketing agreements and licenses in effect:	
At close of 1933-----	60
At close of 1934-----	107

As 1935 opened, the Agricultural Adjustment Act, adopted May 12, 1933, had been in effect for nearly 20 months.

What have been the results of this act? Where do the farmers of the United States, after 20 months of adjustment effort, stand on the economic ladder? This chapter will sketch, in broad fashion, the present economic position of agriculture as a whole. Details on the various commodities will be filled in as the story of adjustment in each commodity is told in succeeding chapters.

I. THE ADJUSTMENT PROBLEM

The act was directed mainly toward correcting those economic conditions in agriculture which had impoverished the farmers and were impeding national recovery. It recognized a disparity between farm prices and prices of nonagricultural products. This disparity seriously restricted farm purchasing power; that is to say, the purchasing power of one-fourth of the Nation's consumers. Under normal circumstances the Nation's farm population depends on the exchange of farm products for about 60 percent of the goods it requires for its living and for operating the farm as a business, and on home production for the remaining 40 percent of its living requirements. Furthermore, each farm is a small factory, buying goods for production as well as for living.

Reduction of the exchange value of farm products, consequently, not only greatly lowered the standard of living on the Nation's farms, but increased industrial unemployment, disrupted commerce, and weakened the national credit structure.

THE PARITY PRICE YARDSTICK

Action to remove the disparity between prices of farm and nonfarm products required definition of a price relationship to be recognized as parity. The act established a specific measure of exchange value for farm products, as an equitable goal for farm prices and an objective for price-improvement efforts. That measure was an exchange value equal to the exchange value in the pre-war period, August 1909 to July 1914. (For tobacco, the relationship between farm prices and prices of nonagricultural products that existed in the post-war period, August 1919 to July 1929, was adopted as the measure.) Parity prices, in other words, are prices for farm products which represent the same purchasing power in relation to goods farmers must buy, as farm products had in the pre-war period.

BALANCING PRODUCTION WITH DEMAND

The Agricultural Adjustment Act, as amended, prescribes adjustment of production as one means of attaining parity prices for agriculture. In the depression, prices of farm products fell much more rapidly than did prices of the products of industry. This, to a large extent, was because, in the face of a decreased market, agriculture did not bring its production down as rapidly as industry did. The resultant agricultural surpluses forced farm prices down below the level of industrial prices. The act provided for adjustment of production to a point which would balance production with demand and thus give farm products an equitable exchange value in terms of industrial goods.

Methods of adjustment by which farm prices might be increased were also prescribed in the act.

PRODUCTION CONTROL AND BENEFIT PAYMENTS

One method, the production-control plan, applies only to farm products defined in the act as basic commodities, and so designated because they contributed a large share of total farm income, because large export surpluses of these commodities existed at the time when the act was passed, and because all are processed before they are

consumed and therefore there is a point at which processing taxes can be levied. Powers were conferred upon the Secretary of Agriculture to enter into voluntary agreements with producers of basic commodities for the control of production, to make benefit payments to farmers who cooperate in adjustment programs, and to fix the rates of processing taxes levied in the act to finance these benefit payments.

The seven basic commodities originally named in the act are wheat, cotton, tobacco, corn and hogs, milk and its products, and rice.

MARKETING AGREEMENTS AND LICENSES

Under the second major method the Secretary of Agriculture was empowered to enter into marketing agreements with processors, producers, associations of producers, and others engaged in the handling of any agricultural commodity or product thereof, in the current of or in competition with, or so as to burden, obstruct, or in any way affect, interstate or foreign commerce, and to issue licenses permitting processors, associations of producers, and others to engage in the handling, in the current of interstate or foreign commerce, of any agricultural commodity or product thereof, or any competing commodity or product thereof. The act further authorized the use of processing-tax proceeds to remove surplus agricultural commodities from commercial channels.

These adjustment methods were intended to facilitate maintenance of farm prices, to enable the farm producers collectively to attain more effective control over the production and marketing of their products, and to give those cooperating in adjustment an advantage over those not cooperating. Protection for consumers against undue price increases in agricultural products was written into the act.

WHAT HAS BEEN ACCOMPLISHED?

The extent to which the objectives defined by the Agricultural Adjustment Act have been attained may be indicated in the answers to several broad questions.

For what commodities have adjustment measures been put into effect?

To what extent have these measures been sponsored by the producers of the crops concerned?

To what extent has the economic position of agriculture improved?

How nearly has the farm price level been brought to parity?

What gains in income have been made by the agricultural population?

What contributions has agriculture made toward business recovery?

How was the consumer affected by farm adjustment measures?

Were adjustment measures sufficiently flexible to help agriculture adapt itself to conditions that have been changing since the adoption of the act?

This report aims to discuss answers to these questions in the light of developments in 1934.

II. THE SCOPE OF THE ADJUSTMENT PROGRAM

SYNOPSIS OF 1933 EFFORTS

In 1933 production-adjustment programs financed by processing taxes and providing for disbursement of rental and benefit payments were applied to cotton, wheat, and one type of tobacco—cigar-leaf. Among the seven commodities originally designated by the act as basic, marketing agreements and licenses were applied to rice and to fluid milk in certain areas.

Marketing agreements and licenses also were initiated for nonbasic commodities.

Under surplus-removal measures, nearly 40 million pounds of butter were removed from commercial channels for relief distribution, and an emergency purchase and slaughter of about 6,000,000 pigs and sows was carried out to support the hog market. The real effect of this slaughter was not felt on the market until the early months of 1934.

Through the Commodity Credit Corporation, loans of 10 cents per pound on cotton and 45 cents per bushel on corn were extended to producers who agreed to participate in 1934 adjustment programs applying to these commodities. These loans helped farmers to hold their products until prices improved.

Actual acreage reductions applied principally to cotton, 10,400,000 acres of which were taken out of production. Acreage reduction under the wheat-adjustment program was unnecessary because of unfavorable weather which restricted the 1933 crop.

CHANGES AND EXTENSIONS IN 1934

During 1934 the programs which had been instituted in 1933 were continued with the following changes and extensions:

Wheat.—Wheat growers who signed contracts agreed to restrict their 1933 seedings to 85 percent of their base acreage for 1934 production. For the 1934 fall seedings this percentage was increased to 90 percent. Under the world wheat agreement other important wheat producing countries agreed upon decreases in their production abroad and upon establishment of export quotas.

Cotton.—The 1934 cotton program, in contrast to that of 1933, was planned to restrict plantings rather than to plow up the growing crop. The reduction thus effected was about 50 percent greater than that of the previous year. In addition to the voluntary program of the Agricultural Adjustment Administration, the Bankhead Cotton Control Act was passed. It put a tax on ginnings in excess of the individual producer's allotment.

Tobacco.—Under seven programs, production control was applied in 1934 to virtually all tobacco grown in continental United States and Puerto Rico. This extension of production control obviated the necessity for 5 of the 6 marketing agreements that had been put into effect in 1933. Accordingly the 1934 crop of only one type of tobacco was covered by a marketing agreement. The Kerr-Smith Act, passed in 1934, supplemented the 1934 adjustment program by taxing sales of tobacco made in excess of allotments under the production-control contracts.

Rice.—The marketing agreement which was inaugurated for rice in 1933 included crop-control provisions for 1934-35 for the California section of the industry; in 1934 the agreement covering rice produced in the southern section, including Arkansas, Louisiana, Tennessee, and Texas, was revised to do likewise. By this means the acreage was reduced from 769,000 acres to 737,000.

Corn and hogs.—Prices of both corn and hogs were affected by action taken in 1933: Corn prices by the corn loans, and hog prices by the emergency slaughter. Actual inauguration of a production-control program did not take place, however, until 1934, when producers of about 60 percent of the Nation's total corn acreage and

77 percent of its total hog production, signed contracts for adjustment of these commodities.

Dairy products.—Milk and its products were the only one of the seven commodities originally named by the Agricultural Adjustment Act as basic, on which a production-control program had not been put into effect by the end of 1934. In that year a dairy-adjustment program was presented to producers, but the support it received from the dairy industry was not deemed sufficient to warrant its adoption.

By licensing the distributors, prices on many milk markets were supported, however. In 1933 marketing agreements and licenses had sought to maintain a stated price to producers and a minimum price to consumers. With the beginning of 1934, milk licenses designed only to maintain producers' prices were put into effect. At the close of the year, 48 such licenses were in effect as compared with 15 marketing agreements and licenses at the end of 1933. The number of pounds of butter removed from commercial channels under surplus-removal programs was increased to nearly 68 million pounds.

Amendments to the Agricultural Adjustment Act in April and May 1934 added 7 products to those named as basic in the original act and brought the total of such commodities to 14. The added products were cattle, sugar beets and sugarcane, peanuts, rye, flax, barley, and grain sorghums. For three of the new basic commodities programs are already in force:

Sugar.—Under the Jones-Costigan amendment to the Agricultural Adjustment Act, a start was made in 1934 to adjust supplies of sugar to consumption requirements. Marketing quotas were established for sugar produced domestically, and import quotas were put into effect for sugar produced in the Philippine Islands, Puerto Rico, the Virgin Islands, the Territory of Hawaii, Cuba, and other foreign countries. Adjustment programs have been applied or developed for producers in the United States, Hawaii, and Puerto Rico. A processing tax of one-half cent per pound was levied to finance the program and an equivalent reduction made in the tariff on sugar so that there was no net cost increase to consumers.

Peanuts.—A marketing agreement and license for peanut millers was put into operation in January 1934. The amendments to the Agricultural Adjustment Act made peanuts a "basic" commodity. A production-control program based upon acreage control and providing for benefit payments in 1935 and a surplus-removal program for diverting part of the 1934 crop to use as oil or feed replaced the marketing agreement.

Cattle.—A program for adjustment of cattle production was developed, but under the drought emergency it was converted quickly into a cattle program, designed to conserve existing supplies of human food and livestock feed by purchase of cattle threatened with starvation and to maintain the foundations of the farming industry in the drought areas.

How drought altered 1934 program.—The change in the cattle program exemplified the type of alterations in several aspects of the adjustment program made necessary by the unprecedented drought of 1934.

The drought necessitated the development of a series of emergency programs. It put new obstacles in the way of maintaining farm income. It required measures to conserve livestock feed supplies

severely depleted by lack of rains and searing heat. It called for preventive action against loss of food supplies through immediate processing of meat animals which otherwise would have died on the ranges or in the field for lack of feed or water. It necessitated aid to make possible the continuance of farming operations in an area which normally provides an important part of the Nation's feed and food supply. It raised the question of how an ever-normal granary can be provided as a safeguard against acute shortages, now that the United States no longer has large stores of commodities intended for export on which to draw in case of domestic need.

Adjusting nonbasic commodities.—At the same time that control programs were being applied to new basic commodities, the scope of marketing agreements and licenses was widely extended, for general crops, which include a large variety of nonbasic commodities such as fruits and vegetables. At the end of 1934, 9 of the marketing agreements dating from 1933 were still in force, and 14 others, signed in the course of the year, were likewise operative.

COMMODITY LOANS

New loans were extended by the Commodity Credit Corporation on corn and cotton in 1934 at increased loan values, and an additional commitment of \$20,000,000 was obtained for loans of 2 cents per pound to the cotton producers' pool. Loans also were extended during the year to producers of gum turpentine and gum rosin.

BULK OF FARM PRODUCTION UNDER ADJUSTMENT

A fair idea of the coverage of the Agricultural Adjustment Act can be obtained from an analysis of the relation of the cash income from the 14 basic commodities to the total farm cash income.

The original seven basic commodities—wheat, cotton, corn, hogs, rice, milk, and tobacco—were the source of from 53 to 58 percent of the Nation's total farm cash income in 1929, 1932, and 1933. The commodities added to the list by amendment in 1934—cattle, sugar beets and sugarcane, peanuts, rye, flax, barley, and grain sorghums—contributed from 11 to 14 percent of the total cash income in those years. The act with its amendments thus authorizes production control, processing taxes, and benefit payments for 14 commodities, which contributed from 67 to 70 percent of the total farm cash income in 1929, 1932, and 1933.

At the close of the year production-control programs involving the levy of processing taxes and the disbursement of rental and benefit payments were in effect for seven basic commodities: wheat, cotton, corn, hogs, tobacco, sugar, and peanuts. While a processing tax was not levied on cattle, a drought cattle-purchase program was in effect in 1934. A production-control program, without a processing tax levy, also was in effect for rice.

These commodities contributed about 50 percent of the Nation's total farm cash income in 1929, about 42 percent in 1932, and nearly 50 percent, including rental and benefit payments, in 1933.

NUMBER OF FARMERS PARTICIPATING

The development of additional programs in 1934 increased decidedly the number of farmers participating in direct production control through contracts with the Secretary of Agriculture. At the close of

1933 a total of 1,925,000 adjustment contracts had been signed with producers. At the close of 1934 more than 3,600,000 such contracts had been signed. The figure for 1933 includes about 200,000 contracts with producers who signed corn-loan agreements to participate in the corn-hog adjustment program that was inaugurated later. The figure for 1934 includes more than 670,000 contracts for drought cattle purchases whose signers agreed to participate in a cattle-adjustment program in the event such a program is instituted before June 1936.

MARKETING AGREEMENTS AND LICENSES IN 1934

The Administration has recognized from the first that improvement in marketing arrangements is a necessary complement and support to production adjustment, and that the two must go together if returns to producers are to be enhanced to a maximum. Specific marketing agreements were utilized to supplement control of the production of wheat, peanuts, tobacco, and rice in 1934.

It is estimated that about 110,000 producers were directly affected by milk licenses at the close of 1934, and about 90,000 producers were directly affected by the evaporated milk agreement. Marketing agreements as mechanisms in the adjustment programs for rice and for wheat exports were continued from 1933 into 1934. Seven marketing agreements were in effect for the 1933 tobacco crop, and one for the 1934 crop. As the control programs were applied, the importance of marketing agreements for maintaining tobacco prices lessened.

Marketing agreements and licenses were applied more widely to nonbasic commodities during the year. To such commodities marketing agreements and licenses are the principal rather than supplementary adjustment mechanisms. These adjustment mechanisms in effect in 1934 benefited over 211,000 producers of general crops, including fruits and vegetables, as compared with 72,000 producers benefited by them in 1933.

At the close of 1933 there were in effect 33 marketing agreements, 7 licenses, and 3 codes. At the close of 1934, after termination of some agreements, 29 marketing agreements, 78 licenses, and 12 codes were in effect.

PRODUCERS MAY BE PARTIES TO AGREEMENTS

Under an amendment to the Agricultural Adjustment Act passed by Congress in 1934, individual producers may be parties to marketing agreements, but may not be put under license. The individual cooperation of producers, it was believed, would result in a more effective control of supplies marketed, which is a necessary element in making marketing agreements successful.

As a further means of regulating marketing or merchandising conditions and protecting the interests of producers, a number of codes were approved by the Secretary of Agriculture and put into effect during 1934 under the National Industrial Recovery Act. Such codes set up standards of fair practice in dealing in agricultural products, applying to grain exchanges, wholesale distributors of fruits and vegetables, flour millers, commercial poultry hatcheries, feed manufacturers, tobacco warehouses, and the New York live poultry market.

DIRECT DECISIONS BY PRODUCERS

Progress toward more direct producer representation in decisions on adjustment programs was made during 1934. Referenda among producers were held on the continuation of the corn-hog program, the provisions of the Bankhead Cotton Act, and the Kerr-Smith Tobacco Act. Local production-control bodies have acquired greater facility in carrying on the functions of adjustment. This makes possible a gradual decentralization of adjustment processes, with only the broader interpretations of the act, and the work of coordination and planning, emanating from Washington.

III. EFFECTS OF THE ADJUSTMENT PROGRAM

IMPROVEMENT IN FARM PRICES

How nearly have the prices of agricultural products approached the parity price level which is a definite objective of the Agricultural Adjustment Act? In March 1933, just before the act went into

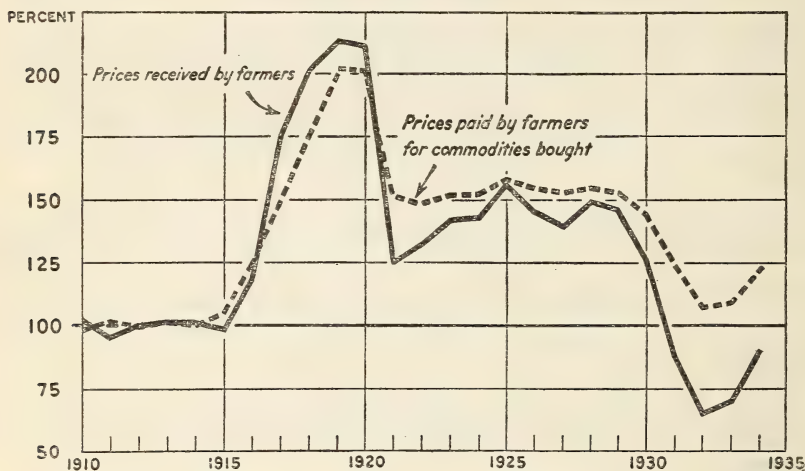


FIGURE 1.—Prices received and prices paid by farmers, 1910 to 1935 (1910-14=100).

effect, prices received by farmers averaged 55 percent of the pre-war level, and the prices of nonagricultural products which farmers buy averaged 100 percent of the pre-war level. Farmers thus exchanged their products at 55 percent of their pre-war exchange value.

In December 1933 the average price of farm products was 78 percent of the pre-war average. The average of prices farmers pay was 116 percent of the pre-war average. The exchange value of farm products was therefore 67 percent of the pre-war average.

On December 15, 1934, the average of farm prices was 101 percent of the pre-war average, and prices farmers pay averaged 126 percent of the pre-war level. The exchange value of farm products was therefore 80 percent of the pre-war level.

Since prices farmers received increased more rapidly than prices they paid, the exchange value of farm products gained. The average exchange value of farm products, in December 1934, was more than

19 percent above that of December 1933, and 47 percent above the average exchange value in March 1933. A comparison of farm prices and prices farmers pay is shown in figure 1.

The production-control programs and the marketing agreements and licenses exerted an influence upon this increase in the farm price level. This influence was noticeable particularly in the early part of the year, before the effects of the drought were reflected in a striking increase in the level of average farm prices. The average farm price advanced from 77 percent of the pre-war average in January 1934 to 86 percent in May. In September, when the full effects of the drought were felt, particularly on marketings of grain, the average rose to 103 percent. From this point it declined to 101 percent in December.

PRICE INCREASES SUPPLEMENTED BY BENEFIT PAYMENTS

These figures do not take into account the additions to farm prices made by benefit payments on seven basic commodities. These payments were financed from the processing taxes levied on the domestic allotment—or domestically consumed portion—of these commodities. The commodities were: Cotton, wheat, corn,¹ hogs, tobacco, sugar, and peanuts. Proceeds of the taxes have been distributed or will be distributed as rental and benefit payments, and in a sense may be said to add 30 percent to the prices that farmers received on the domestically consumed part of these seven commodities.

Since the average farm price of these commodities was about 100 percent of the pre-war average, the average price equivalent including benefit payments for the domestically consumed portions was increased to about 130 percent at the close of 1934. As prices paid by farmers for the goods they buy were 126 percent of the pre-war average, farmers who participated in the adjustment programs were receiving approximately parity prices for the domestic allotments of the seven products for which production-controlled programs have been developed. However, only farmers who receive benefit payments received such returns, and the attainment of parity applies only to the domestic allotment portion of the crop.

Two observations need to be borne in mind here. While parity returns are thus being realized on domestic allotments on the average, certain commodities are still below parity, and others, at least for the time being, are above. In the commodities for which farm prices plus benefit payments are above parity, the 1934 drought has been an important factor and this gain could easily be lost if production in 1935 were normal or better.

ADVANCE IN FARM CASH INCOME

Farm cash income for 1934 is estimated at \$6,100,000,000, representing an increase of about 21 percent over the farm cash income of 1933, which was \$5,051,000,000, and an increase of about 41 percent over the \$4,328,000,000 farm cash income of 1932. The purchasing power of 1934 income was somewhat offset by the fact that prices farmers paid for nonagricultural commodities were 13 percent higher than in 1933 and 15 percent higher than in 1932.

This increase in cash farm income does not, in whole, represent improvement in the actual condition of farmers. A part of this cash

income was derived from the forced sale, caused by the drought, of inventories of livestock and other commodities, and this part of the income did not come from normal and profitable marketing.

Cash available for living, from the 1934 cash income, after deducting wages, operating expenses, taxes, and interest, is estimated at \$3,260,000,000. This compares with \$2,627,000,000 in 1933, and is more than double the total of \$1,463,000,000 available for living in 1932. Taxes and mortgage charges declined and about \$446,000,000, or about 7.3 percent of farm cash income, was received as rental and benefit payments which did not entail the usual costs of production, thus contributing to the increase in farm cash available for living. Most of the increase in farm cash income since 1932 has been income available for raising the farmers' standard of living.

EXTENT OF IMPROVEMENT

In 1932 the money available for living could be exchanged for only about 52 percent of what the pre-war income available for living would

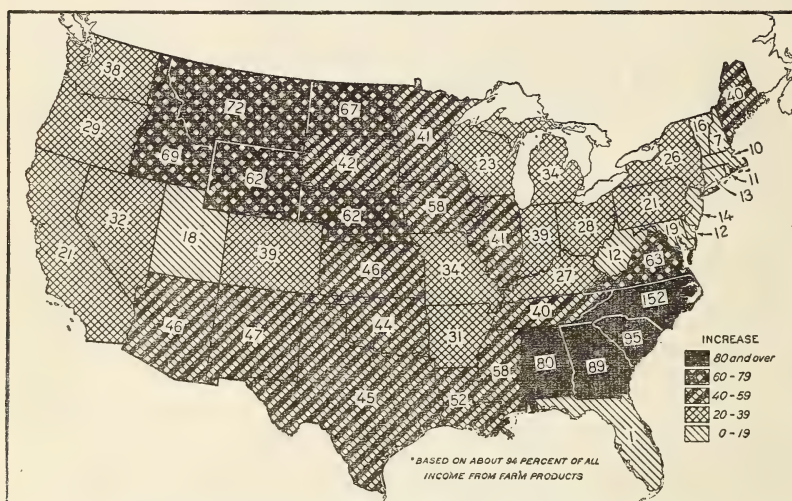


FIGURE 2.—Percentage change in cash receipts from the sale of farm products and rental and benefit payments, from 1932 to 1934.

buy. In 1934 the exchange value of this share of income is about 78 percent of the exchange value of cash income available for living before the war. Thus the welfare of the farmer as measured in terms of goods and services has advanced about 50 percent in 2 years.

The farm share of national income increased in 1934. Analyses of income indicate that farmers received 7.5 percent of total national income in 1932, and 10.2 percent of the total in 1934. According to these indications agriculture's share has increased about one-third since the low point in 1932.

Despite this gain, however, the population gainfully employed in farming does not yet receive an equitable share of the Nation's income. About 23 percent of the Nation's gainfully employed population is engaged in agriculture. If farmers in 1934 had received a per capita share of total national income equal to the average for the

past seven decades, about 13 percent of the Nation's income would have been returned to agriculture. The 1934 share then would have been about one-third larger.

The improvement in the agricultural situation in 1934 is indicated by three important measures: (1) The purchasing power of farm products; (2) the purchasing power of farmers' "net" income available for maintaining their standard of living; and (3) the farmers'

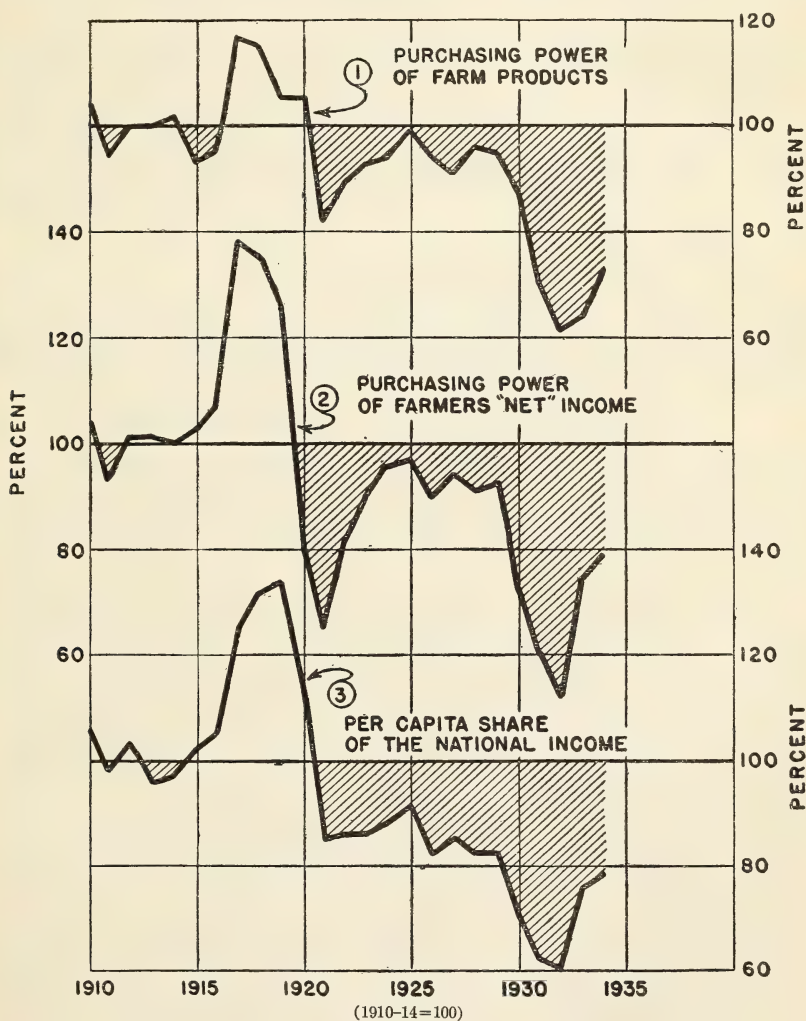


FIGURE 3.—Three measures of the agricultural situation (1910-14=100)

per capita share of the national income. The changes in the agricultural situation with respect to these three measures, since 1910 and through 1934, are illustrated in figure 3.

In 1934 the purchasing power of units of farm products averaged 73 percent of the pre-war level. It had advanced to that level from a low point in March 1933 when it was 55 percent of the pre-war level.

The purchasing power of farmers' net income in 1934 was nearly 80 percent of the pre-war level, as compared with 52 percent in 1932.

The farmers' per capita share of the national income in 1934 was about 80 percent of the pre-war share, as compared with 60 percent in 1932.

RENTAL AND BENEFIT PAYMENTS 7.3 PERCENT OF ALL CASH INCOME

The agricultural adjustment programs in effect during the year had a direct effect in increased farm income, both through price increases and through disbursement of rental and benefit payments.

Rental and benefit payments including those from cotton options actually disbursed among producers under adjustment measures in 1933, totaled about \$131,000,000, a little less than 2.6 percent of that year's farm cash income. In 1934 these disbursements totaled about \$446,000,000, which is about 7.3 percent of the year's farm cash income.

Not only did such adjustment disbursements assume a much more important role in supporting the level of farm income in 1934, but their function as crop-income insurance became much more important because of the heavy crop and livestock losses that resulted from the drought.

FLUCTUATIONS IN TREND OF FARM INCOME

The trend of farm income fluctuated very sharply during the year. The price level was marked by violent swings. Price increases were accompanied by heavy marketings of commodities held back during the long periods of declining prices; price declines were followed by reduced marketings.

During the first half of 1934 farm income averaged approximately 50 percent higher than it did during the first quarter of 1933, just before the Agricultural Adjustment Act went into effect. (This and subsequent comparisons are adjusted for seasonal changes.) With the rise in prices during the summer, farm income increased to a point 83 percent above that of the first quarter of 1933, not including rental and benefit payments. With rental and benefit payments included, the increase was brought to 93 percent.

By November 1934 farm cash income from marketings had declined so that it was about 34 percent in excess of cash income during the first quarter of 1933, but with rental and benefit payments added to the returns from marketings, it was still 56 percent above the early 1933 income.

The decline in cash income during August, September, October, and November of 1934 was due largely to the drastic reduction in marketings which was offset only in part by the higher level of prices. Marketings of livestock, both direct and by Government purchase, were unusually heavy. This contribution to farm income, however, loses much of its significance when it is considered that through such heavy marketings much of the farmers' capital has been converted into current income.

The rise in farm cash income by July 1934 to a point 93 percent above the low level in the first quarter of 1933, and to 56 percent in November 1934 may be contrasted with the increase in factory pay

rolls, which rose during the first half of 1934 to a point about 70 percent above the early 1933 level, but declined in the fall of 1934 to a point about 50 percent above that level.

INCREASED FARM INCOME SUSTAINS BUSINESS ACTIVITY

The increased flow of purchasing power to more than 30 million consumers who live on farms served as a restorative to general business activity, and enabled the farm population to buy more industrial products. When, in the summer of 1934, a decline of industrial activity lowered the buying power of urban areas, increased farm income tended to diminish the resultant recession in retail sales and general business.

Increased farm income is clearly reflected in indexes of general business activity, and particularly in the volume of retail sales of automobiles and general merchandise in rural areas.

IV. THE PRESENT STATUS OF ADJUSTMENT

REDUCTION OF CARRY-OVERS

At the close of 1934 the problem of over-supply has disappeared, for the time being, for wheat, tobacco, corn, and hog products.

The indicated wheat carry-over for 1935 is expected to be not much above the normal 125 million bushels, as compared with nearly 400 million bushels at the beginning of the 1932-33 season.

The indicated carry-over of American cotton is expected to be about 8 million bales, as compared with 13 million bales in the 1932-33 season, and a normal carry-over of about 5 to 7 million bales.

Hog numbers are 30 percent smaller than last year and, largely because of the drought, are lower than planned under the Agricultural Adjustment Administration program.

Beef cattle numbers, since the middle of 1934, declined from the top to the bottom of the present beef-cattle cycle, because of the drought. Increases in supply during the past 6 years, which brought cattle numbers to the highest point in history, have been wiped out.

This adjustment, however, was not a controlled adjustment. Controlled adjustment regulates the number of crop acres in cultivation. Much of the reduction in 1934 production was brought about not by reduction of cultivated acreage but by a drastic reduction in yield per acre—the result of the drought. The acreage planted to corn in 1934 was about 12 percent less than that planted in 1933, but the average yield per acre was 14.8 bushels as compared with 23 bushels in 1933, so that the total 1934 crop was 41 percent less. The 1934 wheat yields averaged 8.5 bushels per seeded acre and the estimated crop is about 497 million bushels, whereas on the same acreage the normal yields of 12.5 to 13 bushels per seeded acre would have produced 730 million bushels. Such drastic reductions are due to drought rather than to a controlled adjustment under the Agricultural Adjustment Act.

1934 VOLUME OF PRODUCTION

The 1934 figures on volume of agricultural production reflect both the effects of the adjustment programs and the effects of the drought.

In 1934 the volume of agricultural production to be marketed and for home use was 2 percent below the average volume in the years 1919 to 1927 inclusive. The 1933 volume was 2 percent above. Volume

production for market and home use in the past year, compared with the production in preceding years, is shown in table 1.

TABLE 1.—*Index of volume of agricultural production by groups of commodities and by years, 1929-34*

[Average for 1919-27=100]

Year	Grains	Fruits, vegeta- bles	Truck crops	Meat animals	Dairy products	Poultry products	Cotton, cotton- seed	All groups
1929.....	87	102	141	105	122	116	118	109
1930.....	77	113	141	101	123	119	110	107
1931.....	80	119	132	103	126	119	134	112
1932.....	76	106	137	104	125	116	104	104
1933.....	54	102	125	112	123	116	103	102
1934 ¹	39	111	135	126	121	107	76	98

¹ Preliminary estimates.

Grain production shows the greatest decline. The reduction is even greater than that shown in the tabulation, which shows only grains produced for sale or home consumption and does not include grains fed, and thus does not fully account for the great reduction in the corn crop.

Livestock production for sale and home consumption increased, but the figure shown in the tabulation indicates rather the heavy forced slaughter during the year which cut deeply into breeding stock.

Dairy production declined for the third successive year.

The decline in grain, livestock, and dairy production was chiefly the results of the drought.

The reduction in cotton and tobacco, both of which showed declines from the production of the previous year, were more closely related to the adjustment programs.

Production of fruits, vegetables, and truck crops, on the other hand, increased well above the volume of 1933.

NEED FOR CONTINUING ADJUSTMENT

With the 1934 yields showing drastic reductions in the yields of the majority of the country's chief farm products, and with the surpluses of previous years reduced to something like normal carry-overs, the question was raised as to whether the need for adjustment measures had passed.

Adjustment does not necessarily mean a reduction in production. It implies reduction only when there is a surplus existing or impending. The reduction which was carried too far by the drought was not the controlled adjustment provided for by the Agricultural Adjustment Act. An event like the drought was far different from controlled adjustment and was in itself responsible for conditions demanding continuation of adjustment measures.

The drought of 1934 was an interlude in a long period of excessive production. It disposed of some surpluses accumulated during that period. But it did not reduce the number of tillable acres which with normal yields could soon accumulate new surpluses if some of these acres were not withheld from the production of crops in which surpluses existed before 1934, and it did not reopen export outlets. It removed the surpluses but did not affect their causes.

EXCESSIVE PRODUCTIVE CAPACITY

The present actual crop acreage is about 360 to 365 million acres, which at average yields is from 15 to 30 million acres above present needs.

Thus, while supplies have been greatly reduced by the drought, there is still an excessive productive capacity. The pressure toward pushing the production of wheat, cotton, corn, and tobacco onto surplus acres has not diminished. To some extent, it has increased. Idle capital and labor still exist. Large numbers are still unemployed; factory pay rolls in November were 41 percent below the 1924-29 level. National income is nearly 40 percent below that of 1929, indicating the extent to which investment capital is not being used. Higher prices for farm products tend to draw this idle capital and labor onto the land, and push production onto surplus acres.

The tendency to overexpand production, after years characterized by low yields and consequent high prices, threatens again to bring surpluses as a sequel to the drought. Livestock numbers have been drastically reduced by the drought. Hog numbers are 30-percent lower, and cattle numbers 10 to 15 percent below those of a year earlier. Normal yields on our full corn acreage would not only replenish our depleted feed supplies, but leave a surplus above the requirements of the diminished livestock numbers. A surplus of feed supplies, with consequent low price, is a forerunner of expansion in livestock numbers. Control of production is needed to prevent this expansion from becoming an overexpansion.

PROGRAMS FOR CONTROLLED EXPANSION

The adjustment programs for the coming months have a controlled expansion in view. The 1934 programs were altered with the advent of drought conditions, to allow an increased production of livestock feed. The 1935 programs for cotton, wheat, tobacco, corn, and hogs all contemplate a larger production than was authorized in the 1934 contracts. The aim behind the increases is to effect production that is large enough while preventing production that is too large for the country's consuming power to handle.

The Agricultural Adjustment Act recognized adjusted production as the key to better farm prices. Despite the severe curtailment by the drought, the volume of farm production in 1934 was only 15 percent below that of 1929. By contrast, the volume of industrial production in 1934 was 42 percent below that of 1929. Industrial prices received the support of a greater curtailment of production than did agricultural prices. While prices of industrial products declined only 14 percent, farm prices declined 40 percent.

The exchange value of farm products depends not only on the prices farmers receive but also upon the prices they must pay for the products of industry. Agriculture now is supplying about all that urban consumers, with limited buying power, can absorb and still maintain the recent improvement in farm prices. Farmers can maintain their production on a sound economic basis by producing what consumers can buy and pay for at prices that will give the farmer a reasonable return. The ability of consumers in cities to buy farm products will be increased by an expansion of industrial activity which increases consumer income.

INDUSTRIAL PRODUCTION IMPORTANT FACTOR

The developments in 1934 have ushered agricultural adjustment out of the situation in which reduction is the dominant factor. The policy that directs agricultural adjustment is not one of permanent scarcity. It aims at abundance of production to meet all market requirements at a fair price. However, the economic welfare of the farmer requires an approach to abundant production by industry as well as agriculture. As industry expands its production and through pay-roll expansion increases the income of urban consumers, agricultural production can be expanded. Farm income from products sold largely in domestic markets varies with changes in city pay rolls. The extent to which agricultural production can be expanded to an abundant scale of national living depends largely on how far industry pushes its production toward that goal.

While efforts have been made to expand export outlets and these efforts have borne fruit in one trade agreement, with Cuba, during the year, no immediate great increase in exports of agricultural commodities is in prospect. If the United States is to sell more abroad, it must buy more abroad. Development of a policy that will result in an expansion of export outlets is still a prospect for the future. For a more immediate expansion of production, agriculture must rely on a corresponding increase in the domestic market, which in turn depends upon increased consumer income.

HOLDING THE GAINS

During the 20 months that the Agricultural Adjustment Act has been in operation, farm income has increased; farm production has about balanced current demands so as to give the farmer a fairer share of the national income; and agriculture has attained an increased control over its production and markets. The problem now is to hold the gains that have been made in adjusting agriculture to an emergency situation, and to push adjustments toward the long-time objectives, discussed later in this report.

To hold these gains, agriculture must continue to maintain a balanced output. Immediate abandonment of the measures of control would be almost certain to bring a new cycle of excessive production and collapse of prices. Such an eventuality would be disastrous not only to agriculture but to the Nation as a whole. On the other hand, if agriculture retains its measures of control, the gains that have been made can be held and, as the rest of the Nation advances toward recovery, agriculture can share in that advance.

CHAPTER 2

THE DROUGHT CRISIS AND HOW IT WAS MET

SALIENT FACTS ABOUT MEETING THE DROUGHT

1. Total funds allotted to Agricultural Adjustment Administration for drought relief.....	\$153, 600, 000
2. Number of counties designated when designations terminated:	
Emergency counties.....	1, 187
Secondary counties.....	262
3. Total expended on cattle purchases to Jan. 1, 1935.....	\$102, 744, 455
Purchase payment rate per head.....	\$1 to \$14
Service payment rate per head.....	\$3 to \$6
Number head of cattle purchased to Jan. 1, 1935.....	7, 815, 026
Number of farms from which drought cattle purchases were made.....	675, 499
Percent of total inventory on these farms purchased in program.....	30. 2
4. Total expended on purchase of sheep and goats to Jan. 1, 1935.....	\$7, 136, 309
Number of farms from which sheep and goats were purchased.....	27, 555
Percent of inventory of sheep on these farms purchased.....	20. 7
Percent of inventory of goats purchased.....	36. 6
Rate of purchase and service payment per head for sheep.....	\$2
Rate of purchase and service payment per head for goats.....	\$1. 40
5. Amount allotted for seed conservation purchases.....	\$25, 000, 000

The great drought of 1934, which extended its blighting effects over nearly three-fourths of the area of the United States, was unprecedented in the agricultural history of the Nation.

It brought great loss and distress to millions of farmers, and precipitated a national emergency. To meet this emergency a correlated program of Federal relief was at once inaugurated when it was realized that what at first appeared to be only a spring drought was extending on through the growing season. To understand the full scope of this program, and to grasp the full import of the conditions it was designed to alleviate, it is necessary to review briefly the drought conditions as they developed.

I. EARLY STAGES OF THE DROUGHT

The first stage of the drought, centering around the Dakotas and Minnesota, might be termed the climax of a series of recurring downward trends in rainfall in that area during the last decade. This condition became pronounced in 1929, and grew more serious until it culminated in the most disastrous and far-reaching drought recorded by the Weather Bureau in the 70 years of its operation.

The reported rainfall in North Dakota and South Dakota has been below normal during 8 of the last 10 years, and during the first 4 months of 1934, up to May 1, the lightest rainfall for a similar period was recorded. In Minnesota, 9 of the last 10 years have been relatively dry, and in 1934, up to May 1, only 54 percent of the normal rainfall was reported. In Nebraska, 9 of the last 10 years were periods of short rainfall, and during the first 4 months of 1934, precipitation was only half of normal. In Montana, 8 of the last 10 years have been deficient in rainfall, and from January to May of 1934 only 79 percent of the normal precipitation was recorded.

In addition to the drought condition in this northwestern group of States, pronounced deficiency in rainfall developed over a large area comprising western Kansas, parts of Missouri, Iowa, Wisconsin, Michigan, Illinois, Indiana, Ohio, and Kentucky. In the first 4 months of 1934 Kansas had only 62 percent of normal rainfall; Missouri had 66 percent; Iowa, 57 percent; and Ohio, 61 percent. Compared with corresponding months of previous years, these 4 months were the driest months on record for Illinois; the driest since 1889 for Indiana; the driest since 1902 for Ohio; the fourth driest for

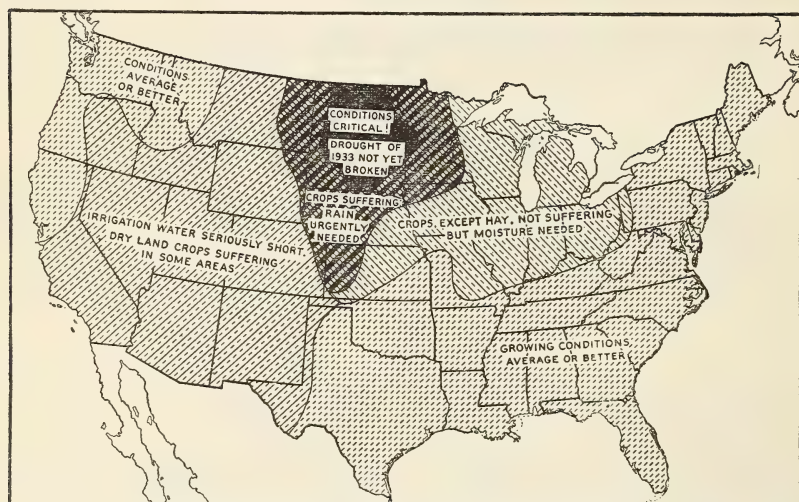


FIGURE 4.—Crop conditions as reported on May 13, 1934.

Iowa; the driest since 1895 for Missouri; and the driest since 1909 for Kansas.

For a group of Northwestern States comprising North Dakota, South Dakota, Nebraska, and Minnesota, the 5-year average of rainfall, up to the end of 1933, was 19 inches; while for the 5 years ending with 1909, at the time of the last maximum phase in this area, the average was 24.1 inches, or 27 percent greater.

CROP CONDITIONS

The drought, entering a serious state in April, became worse in May, the month when all small grains normally are getting their start. (See fig. 4.) In wide areas these grains were blasted beyond recovery, despite the scattered rains in June. These rains were neither general

nor generous enough to supply adequate moisture for growing crops and the drought only intensified and extended its area in July.

From the drought area, early in May, came many reports of serious damage to crops and shortage of water supply. In North Dakota, 29 counties reported the "drought of 1933 not yet broken"; 17 counties reported "crops destroyed"; 34 counties reported "dust storms" seriously affecting crops and livestock; 32 counties reported "no feed"; and 13 counties reported "stock dying." Other counties reported "crops suffering"; "seeding stopped because of wind-storms"; "insects ravaging crops"; and "dire need for human food." Similar reports came from Minnesota, South Dakota, and eastern Montana, and later from many other quarters.

As the drought spread and intensified it became evident that short crops would be the dominant fact in this year's harvest. Before it was broken late in the fall, it had resulted in the wheat crop's being only half the average size; the corn crop's being the smallest in 40 years; the smallest barley crop in 34 years; the production of oats, rye, and buckwheat the smallest in more than half a century. Fall pastures over the Nation were cut down to 39 percent of normal, and the output of hay and feed grains during the season of 1934 was fully one-third less than the requirements to carry through the winter even the reduced numbers of livestock to be fed.

Table 2 shows the progress of the drought as indicated by successive forecasts of crop production.

TABLE 2.—*Progress of the drought as shown by successive crop forecasts*

(Indicated production in millions)

	April		May		June		July		August	
	Indicated production	Percent of normal	Indicated production	Percent of normal	Indicated production	Percent of normal	Indicated production	Percent of normal	Indicated production	Percent of normal
Winter wheat.....	<i>Bushels</i> 491.8	74.3	<i>Bushels</i> 461.5	70.9	<i>Bushels</i> 400.4	55.3	<i>Bushels</i> 394	57.2	<i>Bushels</i> 401	-----
Spring wheat.....						41.3	89.4	38.4	90.4	30.4
Corn.....							2,113	71.8	1,607	49.1
Barley.....						44.7	125	45.9	119	40.3
Oats.....						47.2	568	40.0	545	36.2
Rye.....		63.8	27.9	67.8	18.8	43.5	17.2	40.2	17.3	-----
Flax.....							5.6	47.9	5.3	40.3
Grain sorghums.....									54.3	29.7
Tame hay.....				69.9		53.9	<i>Tons</i> 52.0	48.9	<i>Tons</i> 49.0	45.9
Wild hay.....						37.7	5.5	35.3	4.7	28.5
Pasture.....		67.1		66.2		53.2		48.9		39.0

GRAIN CROPS THREATENED

As the drought reached the acute stage in 24 States in May, it was realized that, while later rainfall might be of material aid, the damage had gone so far that full recovery would not be possible. It was then apparent that through crop and livestock losses the income of a large proportion of the farm population was in danger of drastic curtailment. Before June 1, serious crop and livestock losses had been suffered in Wisconsin, Minnesota, South Dakota, North Dakota, Kansas, Nebraska, Montana, Utah, and Colorado, whose annual farm cash income totalled \$1,000,000,000 in the year 1933.

ADAPTED SEED STOCKS LOW

One of the first problems apparent in the drought was that of maintaining stocks of adapted varieties of seeds. Such seeds, developed through years of research and experiment, and representing a large amount of capital invested to promote more efficient production, were threatened with extinction through mixing, feeding, and processing. Because these seed stocks are ordinarily replenished from year to year, a large part of the last year's surplus over planting requirements had moved into commercial channels, or was being fed, before it was realized that on many farms the 1934 crop would not return even the amount of seed planted.

THE LIVESTOCK EMERGENCY

A more immediate emergency was the acute feed and water shortage which in many instances made it impossible for farmers to carry their cattle any longer. Water had to be shipped in tank cars to many areas. New wells were dug, and old ones sunk deeper with assistance given by the Federal Emergency Relief Administration, in an effort to replenish water supplies.

Feed supplies were being cut so sharply under the requirements of the numbers of livestock on farms that farmers were left with the alternative of rushing their stock to market in unfinished condition and without regard to prices; or leaving the animals to die of thirst and starvation.

With extremely dry weather during the summer and fall of 1933, and short crops, the livestock had come out of the winter of 1933-34 in very poor condition and very little pasture was available to relieve the feed shortage. Producers had held on in the vain hope that the drought would be broken and that disposal of their herds would be unnecessary. In the areas where conditions were most acute, many of the cattle were so thin and emaciated that they could not withstand the shipment to market. Even if it had been possible to get them to market alive, they would have been condemned as unfit for human food because of their extreme emaciation.

However, in June, the forced liquidation of meat animals from the stricken States reached such volume as to drive down the price of all animals, and the prices of thin and off-quality stock sank to such low levels as to represent little, if any, return above the cost of transportation and commission charges.

II. PRELIMINARY MOVES TO MEET CRISIS

Fortunately, the most damaging drought on record found the Government better prepared to take care of such an emergency than it ever previously had been.

The Government's unusual preparedness for the drought of 1934 was due to the fact that Congress had created the emergency agencies with broad and flexible powers to meet any critical situation, and that these agencies were already in operation when the drought became acute. They could and did go into immediate action.

The Agricultural Adjustment Administration, together with other governmental units of the Department of Agriculture and the Farm Credit Administration, and the Federal Emergency Relief Administration, started upon relief measures to meet the immediate emergency at

the outset of the drought and to avert, if possible, future disastrous consequences. As it became increasingly evident that the most serious results of the drought would extend through the winter of 1934-35, plans were developed to avoid or mitigate later effects as well.

The actions undertaken by the Agricultural Adjustment Administration, both to meet the immediate emergency and to avoid after-effects of the drought, were in accord with the broad general policy that farm income and buying power should be maintained despite severe losses in production, not only to prevent immediate results upon the farm population of such a loss in buying power, but also to prevent retarding the many programs of recovery directed toward increasing buying power for the Nation as a whole.

This policy also sought to keep farm production in drought areas in reasonable balance and capable of future production by maintaining foundation livestock, seeds, and population on the land.

AGENCIES ORGANIZED FOR ASSISTANCE

The Government was ready to act promptly because Congress had established these emergency agencies with their broad authority and powers, and because the agencies already had their machinery set up and operating to meet another kind of emergency—depression—when the drought struck. By the latter part of May, drought-relief operations were well under way.

The complete drought situation was laid before the President on May 25, and again on June 2, after drought conditions had grown more acute and the drought area had widened.

While the emergency agencies were getting into action in the drought area, relying upon funds already available for rendering first aid, President Roosevelt sent a special message to Congress asking for necessary appropriations to carry the program to a successful finish.

Congress, cooperating with the President, voted \$525,000,000 to be allocated among the various agencies cooperating in drought-relief measures. From this fund and from the funds appropriated under the Jones-Connally Act and its amendments, there was allotted to the Agricultural Adjustment Administration a total of \$153,600,000 as shown in table 3.

The President appointed the President's Drought Relief Committee to represent him in matters pertaining to the drought. The committee membership was drawn from three important agencies and included Henry A. Wallace, Secretary of Agriculture; Chester C. Davis, Administrator, Agricultural Adjustment Act; Harry L. Hopkins, Administrator, Federal Emergency Relief Administration; William I. Myers, Governor, Farm Credit Administration.

TABLE 3.—*Allotment of funds to the Agricultural Adjustment Administration for drought-relief purposes*

Source	Purpose	Amount allotted
Jones-Connally amendment.....	Cattle purchase.....	\$68,000,000
Emergency Appropriation Act, 1935.....	do.....	50,600,000
Do.....	Sheep purchase.....	10,000,000
Do.....	Seed purchase.....	25,000,000
Total of allotments for drought-relief purposes.....		153,600,000

DIVISION OF RESPONSIBILITIES

Government agencies cooperating in the joint drought-relief activities, and their relief contributions are:

I. The Agricultural Adjustment Administration.

- (1) Purchase of surplus livestock.
- (2) Modification of contract acreage to encourage the production of forage crops.
- (3) Complete survey to determine feed and seed needs.
- (4) Coordination of feed acquisition through commercial channels and distribution of feed supplies to deficit areas.
- (5) Purchase of adapted seed grain.
- (6) Maintenance of farm income through rental and benefit payments.

II. The Farm Credit Administration.

Granting emergency loans to farmers for buying and moving feed and seed with emphasis on the maintenance of foundation herds, for cattle movement, and for other purposes.

III. The Federal Emergency Relief Administration.

- (1) Processing of cattle purchased by the Agricultural Adjustment Administration into edible meat for relief distribution.
- (2) Increasing employment and purchase of lands in stricken areas.
- (3) Where necessary, supplying necessities of life to farm families made destitute by crop failure.

IV. The Civilian Conservation Corps.

- (1) Increased enrollment of youths in drought area.
- (2) Forestation and other measures to conserve moisture, prevent wind erosion, and to minimize the effects of future drought.

BENEFIT PAYMENTS SERVED AS INCOME INSURANCE

Because rental and benefit payments to producers under crop-adjustment programs are based on past average production, rather than on current seasonal production, such payments were not decreased by the wide-spread failure of crops throughout the States in the drought area. Farmers participating in one or more of the adjustment programs were assured of a certain amount of cash income, despite the complete or partial loss of their 1934 crop production through drought, pest, flood, or any other cause. The adjustment programs in effect functioned as a crop-income insurance plan. Never before had American agriculture insured its crop against losses on so large a scale.

Up to December 1, 1934, the Agricultural Adjustment Administration had disbursed in rental and benefit payments under the wheat, corn-hog, cotton, and tobacco programs a total of \$356,040,157 in States within the officially designated drought area.

Because these payments represented clear income, nonassignable and without liability to existing liens, farmers were free to apply them to the most pressing needs in their particular cases. They were comparable to net income, above most of the usual expenses of production.

These payments assisted in maintaining continued production on farms where income from crops and livestock sources, which had been destroyed or seriously curtailed by drought, could no longer assure such continuation. They provided cash for the purchase of feed to carry livestock through the season and for planting late emergency feed and forage crops. Together with commodity loans, they provided cash so that farmers, partially freed from the need of emergency marketing, could hold back their products until a more normal market would bring them better prices. They somewhat eased the strain on both Governmental and commercial credit. They provided

food, clothing, and fuel for thousands of families whose usual sources of income had been wiped out by drought, and provided an alternative to direct aid from relief sources.

Because the benefit payments extend through 1935 under present programs, they will in no small measure enable farmers to combat the after effects and serious dislocations of the drought, and will be of material assistance in a return to normal production.

DROUGHT RELIEF AND THE ADJUSTMENT ADMINISTRATION

A large part of the responsibility for Federal relief for farmers in drought-stricken areas became the function of the Agricultural Adjustment Administration.

Under the Jones-Connally Act, a program was already being considered for eliminating diseased stock from herds in order to improve



FIGURE 5.—Areas designated as emergency and secondary drought areas on May 23, 1934, the date of the first official designation.

the dairy and beef industries over the entire country, and an adjustment program for removing the surplus supply of cattle was being developed in cooperation with producers.

With the appropriations that were available, the Department of Agriculture took immediate steps to ease the situation in the most seriously affected areas. The Adjustment Administration was, therefore, ready to act without delay.

Purchases of cattle were made in drought areas where the feed situation was so acute that the animals could no longer be carried on the farms, and planting restrictions on farms that were under adjustment contracts were modified in order to encourage seeding emergency forage crops to replace in part the feed crops destroyed by the drought. These were the first contributions of the Agricultural Adjustment Administration to the program.

On May 23, 1934, the drought relief service was created as a joint agency of the United States Department of Agriculture and the Agricultural Adjustment Administration, to inaugurate and effect relief measures in States and counties designated from time to time as drought areas.

DROUGHT AREAS DESIGNATED

The first functions of this service were to accumulate and digest information about drought areas. The area designation committee, composed of members of the Bureau of Agricultural Economics and

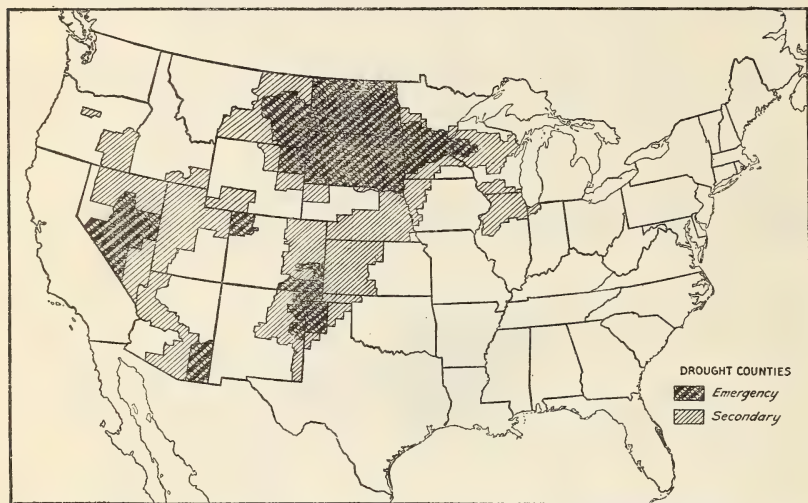


FIGURE 6.—On June 7, 1934, the spread of drought conditions had made necessary a wider designation of drought areas.

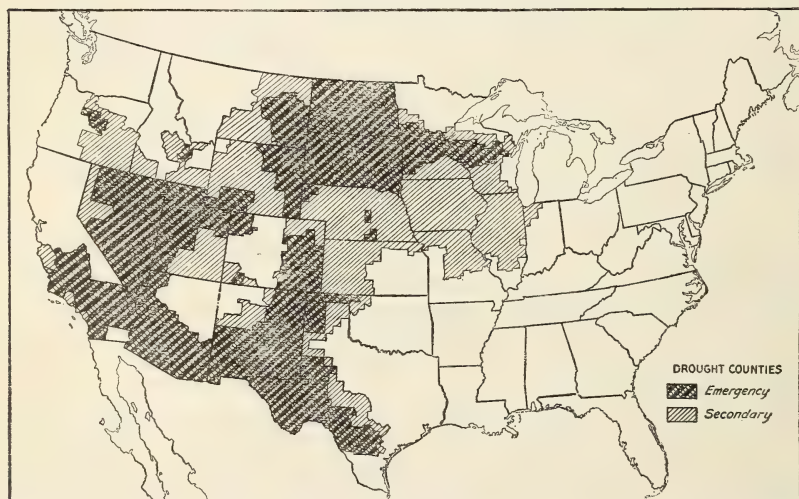


FIGURE 7.—The drought continued to grow more severe—designated drought areas on July 2, 1934.

the Agricultural Extension Service, recommended two classifications of drought areas by States and counties.

The areas most seriously affected were designated as emergency areas. The next class were designated as secondary drought areas. From time to time, as the drought intensified and the affected area

was enlarged, this committee officially designated counties as in one or the other classification. The successive designations of emergency and secondary drought counties, are shown in figures 5 to 9, inclusive.

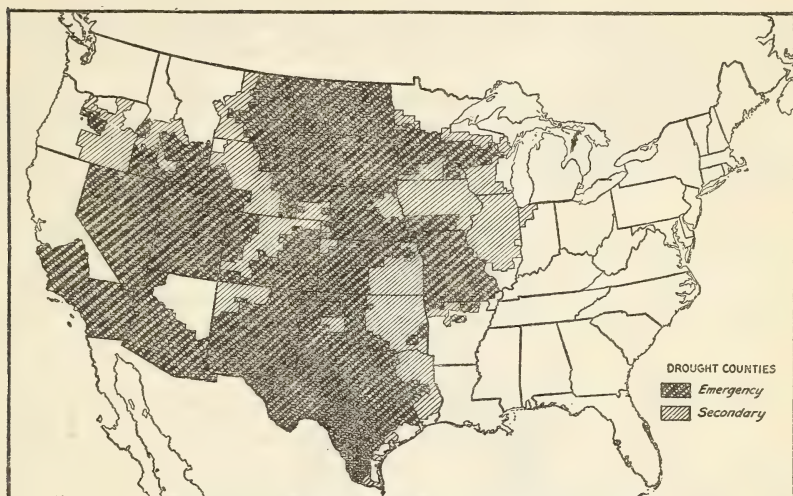


FIGURE 8.—By August 1, the effect of the drought was severe—areas indicated had been officially designated as emergency or secondary drought areas.

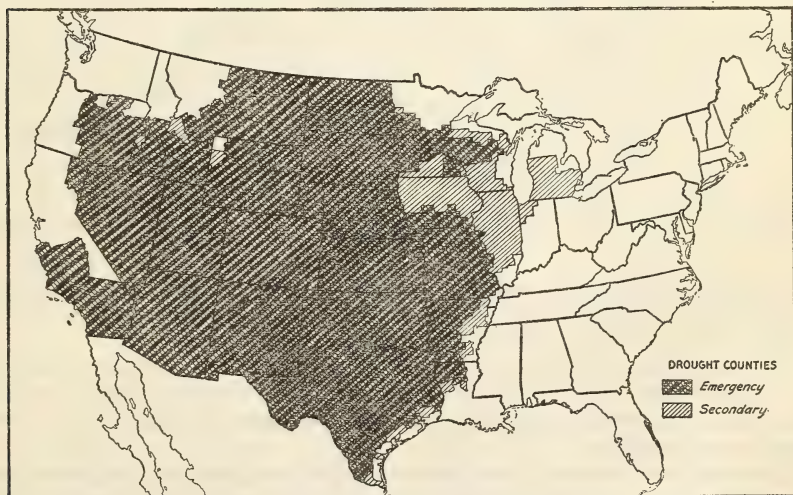


FIGURE 9.—The intensified drought condition on October 24, 1934, is indicated in the spread of territory officially designated as emergency and secondary drought areas.

In the emergency counties, planting restrictions in wheat, corn-hog and tobacco-adjustment contracts were modified to encourage increased planting of needed forage and pasturing of contract acreage, and cattle were purchased where the feed and water shortage was acute.

In the secondary counties, up to the end of 1934, all assistance rendered in emergency areas has been given, except cattle purchasing.

The first drought area was designated on May 23, and consisted of 121 emergency counties in three States, North Dakota, South Dakota, and Minnesota, and 98 secondary counties in these States and in Wyoming, Wisconsin, and Montana. The designation was based on recommendations of the Bureau of Agricultural Economics, and the Extension Service.

The interdepartmental committee on transportation was set up at the request of the President's drought committee, to link the several governmental agencies primarily interested in the drought, with the Interstate Commerce Commission in a study of needs for reduced

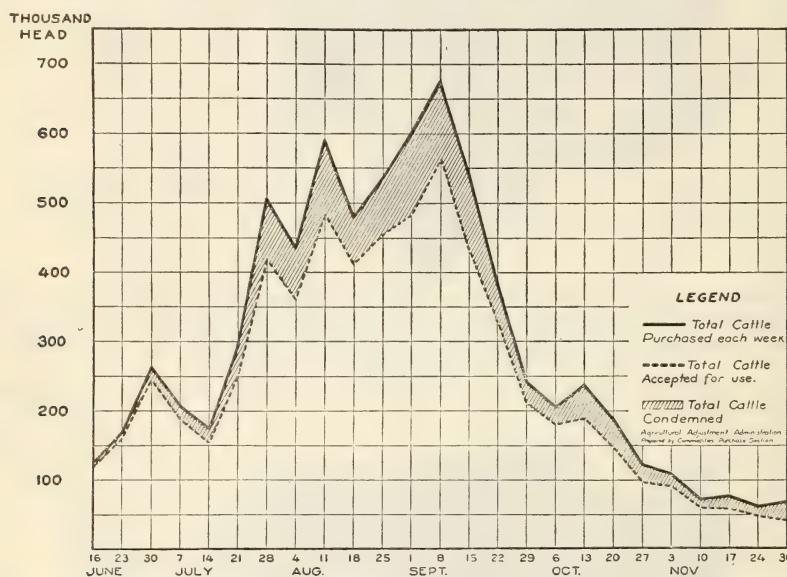


FIGURE 10.—Emergency cattle purchases by weeks, June 16, 1934, through November 30, 1934.

emergency freight rates on shipments of livestock from the drought areas, and on shipments of feed supplies into these areas and to confer with carriers with regard to granting reduced rates.

The seed conservation committee was established to make a survey of feed supplies and to formulate a program for insuring that adequate supplies of superior and adapted seed varieties would be conserved insofar as possible.

The administration of the drought-relief programs in the States was placed under State directors of emergency drought relief, appointed on May 22 for North Dakota, South Dakota, and Minnesota. As the drought area expanded, a director was appointed for each State coming into the drought classification. The State directors were given general supervision of emergency drought activities in their States under the Department of Agriculture and the Agricultural Adjustment Administration. They cooperated with regional and State representatives of the Federal Emergency Relief Administration, the Farm Credit Administration, and other agencies in developing

and administering the correlated program of drought relief. Special county committees, headed by county agricultural agents or other representatives of the State directors, carried out the actual field work of administering the program.

III. EMERGENCY CATTLE AND SHEEP BUYING PROGRAM

Before the drought developed to its most severe stage the cattle industry was giving considerable attention to the problem of surplus cattle production in the United States. During May 1934 a committee consisting of representatives of cattle producers from all sections of the country had been working with officials of the Agricultural Adjustment Administration in an effort to develop a satisfactory cattle-reduction program.

Because of the drought crisis, plans for this program were suspended and two primary measures of adjusting livestock numbers to available feed supplies were adopted: (1) Movement of stock feed into drought areas; and (2) purchase and removal of surplus cattle and calves from the drought area. (See fig. 10 and table 4.)

TABLE 4.—Data on emergency cattle-purchase program, by weeks and by months, June 16, 1934, to Dec. 31, 1934

	Number purchased	Number condemned	Percent- age of number purchased condemned		Number purchased	Number condemned	Percent- age of number purchased condemned
Week ending—				Week ending—			
June 16.....	125,887	6,764	5.37	Nov. 3.....	108,418	17,842	16.46
June 23.....	169,497	9,279	5.47	Nov. 10.....	72,168	12,094	16.76
June 30.....	262,009	16,935	6.46	Nov. 17.....	77,308	19,452	25.16
July 7.....	207,569	20,088	9.68	Nov. 24.....	61,827	13,666	22.10
July 14.....	174,749	21,099	12.07	Nov. 30.....	68,099	16,704	24.53
July 21.....	293,327	41,219	14.05	Dec. 8.....	42,415	20,782	49.00
July 28.....	506,273	88,421	17.47	Dec. 15.....	62,472	19,374	31.01
Aug. 4.....	436,048	76,476	17.54	Dec. 24.....	145,310	43,458	29.91
Aug. 11.....	588,779	105,446	17.91	Dec. 31.....	188,305	46,886	24.90
Aug. 18.....	479,596	68,167	14.21				
Aug. 25.....	535,819	82,013	15.31	Total.....	7,796,245	1,307,612	16.77
Sept. 1.....	600,808	117,468	19.55	Month of—			
Sept. 8.....	674,701	112,242	16.64	June.....	557,393	32,978	5.92
Sept. 15.....	540,596	108,773	20.12	July.....	1,376,270	204,913	14.89
Sept. 22.....	381,777	53,786	14.09	August.....	2,394,698	405,317	16.93
Sept. 29.....	240,833	29,622	12.30	September.....	1,889,907	314,590	16.65
Oct. 6.....	204,666	24,181	11.81	October.....	830,386	152,513	18.37
Oct. 13.....	237,345	49,717	20.95	November.....	309,089	66,801	21.61
Oct. 20.....	187,050	40,538	21.67	December.....	438,502	130,500	29.76
Oct. 27.....	122,594	25,120	20.49				

Because funds were immediately available from the appropriations made under the Jones-Connally Cattle Act which was enacted April 7, 1934, a program for relieving the distressed-cattle problem in the drought areas could be initiated at once. This was of great importance because heavy losses of cattle from thirst and starvation were being reported in late May, and the whole beef market was threatened with demoralization from distress shipments. The Adjustment Administration could and did proceed with cattle buying under the Jones-Connally Act, without waiting for the enactment of the emergency drought appropriation, and before the emergency appropriation was enacted on June 19, 213,124 head of cattle had been purchased in four States.

Three principal methods of disposal of purchased animals were determined upon. They were:

1. A sufficient supply was to be processed and distributed by the State emergency relief administrations, through their county units, to provide fresh or canned beef for local needs. The relief administrations set up local work projects for processing these animals.

2. Animals worth transporting and not allocated to State or county relief units were to be transported to processing plants to be canned and distributed by the Federal Surplus Relief Corporation in accordance with the usual practice of this corporation.

3. All animals unfit for food were to be condemned and destroyed on the farms or ranches where they were purchased.

In addition, some of the cattle purchased from farmers unable to carry them through the winter because of lack of feed were distributed among families who came under the operation of the rural rehabilitation program. Carcasses of animals that were fit for food, but unable to stand shipment to market were given to persons in the vicinity who were on relief.

PAYMENTS FREE FROM MORTGAGES ON THE CATTLE

Cattle buying operations were started on June 1, 1934. Farmers were offered a contract under which they would receive not only a purchase payment in accordance with an established schedule, but also a service payment which was not subject to any mortgage that might be on the cattle.

Such payments came within the scope of the Jones-Connally Act and therefore could be made immediately. The contract contained a clause by which the producer agreed to participate in any future adjustment program for cattle. By an administrative ruling this clause is to become inoperative after June 1, 1936, and will not be binding upon producers after that date. The clause in question was similar to cooperative clauses required in cotton- and corn-loan contracts.

The plan was entirely voluntary, decision as to its acceptance being left to the individual farmer in every case.

The purchase-payment price schedule under which the cattle were bought was as follows: Cattle over 2 years of age, \$6 to \$14 per head; cattle 1 to 2 years of age, \$5 to \$10 per head; under 1 year of age, \$1 to \$5 per head. The service payments were at the rate of \$6 per head on cattle over 2 years of age; \$5 per head on cattle 1 to 2 years of age; and \$3 per head under 1 year of age.

County agents or other representatives of the State directors of emergency drought relief served as county directors of the cattle-purchase program. Inspectors of the Bureau of Animal Industry of the Department of Agriculture cooperated with the county directors in inspection and other field purchase activities. Accredited veterinarians, or local committees appointed for the purpose, appraised the animals. Field agents of the Federal Surplus Relief Corporation took delivery of the animals at local points and shipped them to be slaughtered and processed.

The drought took its heaviest toll during July. By August 1 most of the western cattle-producing country had been classified in the emergency area, except the western part of Montana and a small strip running down through the high mountain areas in Wyoming, Colorado, New Mexico, and Arizona. In Missouri and southern

Iowa, where conditions had been relatively favorable during the first part of June, the continued hot weather and lack of rainfall during July caused heavy deterioration of the corn crop, and a serious water shortage in many sections.

TWO MILLION CATTLE PURCHASED BY AUGUST 1

By the first of August, 2 million cattle had been purchased in 19 States at an average cost of approximately \$13.64. About 250,000, or 12.5 percent, had been condemned as unfit for food, and 1,750,000 turned over to the Federal Surplus Relief Corporation for relief purposes. It was evident by that time that the drought had created the most acute feed shortage on record.

During the month of August there was considerable rainfall in Western and Midwestern States which improved the pasture situation somewhat, and increased prospects for production of emergency forage crops. But rain came too late for corn, and only a partial recovery was possible in the case of pasturage and range.

By the middle of August, the drought had developed to a point at which probable feed supplies could be estimated within reasonable limits and the Adjustment Administration began to reach more definite conclusions as to the probable extent of cattle purchases necessary as a means of helping to balance livestock demands and the feed supply for the coming winter.

It was apparent at the time that even if the Government purchased 10 million cattle and calves, and marketings through commercial channels were in normal relation to the cattle population, the feed supply per animal unit would still be well below normal. On the other hand, it was recognized that a purchase program of this magnitude would be not desirable, except as a last resort.

Early in August, the Adjustment Administration announced that an analysis of probable feed supplies indicated that it would be necessary to purchase at least 5 million cattle and calves, in addition to the 2 million that had been purchased up to that time.

PROVISION MADE FOR MAINTAINING HERDS

With a view to maintaining animals on the farm wherever possible, State directors in charge of cattle purchases were instructed to give priority in the purchase of animals to those areas in most distressed condition, and that purchases from individual producers were not to be in excess of the number which it was found necessary to remove in order to make reasonably certain that the livestock remaining on the farm or ranch could be maintained during the winter.

The end of August brought the total cattle purchases in 21 States to a little over $4\frac{1}{2}$ million head bought from more than 300,000 farmers.

By December 1, 1934, the cattle-purchase program had resulted in the acquisition of 7,273,617 cattle from 602,485 farms in 24 drought States. Practically all of the funds made available both from the Jones-Connally Act appropriations and from the Emergency Appropriations of 1935 for this purpose had been exhausted, since purchase payments together with benefit payments totaled \$98,447,815. For the cattle purchased, the Government paid an average price, for all ages, of \$13.57 per head.

On the same date, 4,385,629 head of the purchased cattle had been loaded and shipped by the Federal Surplus Relief Corporation, while 1,182,446 had been condemned as unfit for human consumption and were destroyed upon the farms. The balance of the cattle that had been purchased were in the process of movement to delivery points or were awaiting shipment.

Not all of the cattle delivered to the Federal Surplus Relief Corporation were slaughtered immediately. More than 1,533,500 head were shipped to Central, Southern, and Eastern States where drought had not affected the pastures, and were placed on grazing for later disposition, thus easing up the pressure on packing facilities, and increasing the amount of food to be obtained when the cattle were eventually slaughtered.

INFORMATION AGENCY ESTABLISHED

On December 4, as a measure to assist producers in the western cattle country to dispose of livestock which they could not feed through the winter, and yet to maintain, insofar as possible, the existing number of livestock, the Adjustment Administration inaugurated an information clearing-house service with headquarters at Kansas City, Mo., to facilitate the movement of cattle from drought areas to areas where farmers had surplus feed.

Under this plan, State and county drought directors were advised to list with the Kansas City agency livestock which should be removed from the drought areas, either through sale or through an arrangement by which the animals could be fed on contract. Likewise, State directors of extension and county agents in nondrought areas were requested to furnish information as to farmers with surplus feed on hand who would be interested in taking over winter feeding of cattle on contract or in the purchase of cattle.

In this way the commercial movement of cattle was accelerated, the burden of feeding the cattle in the drought States was lessened, and the preservation of sufficient breeding stock to maintain the requisite cattle population was encouraged.

In December 1934 the allotment of funds available for purchasing drought cattle was increased to a total of \$115,892,363 through new allocations of funds made available by the emergency appropriations act and the Jones-Connally act. This made it possible to purchase approximately 1,200,000 more drought cattle.

Authorizations to purchase additional cattle were issued for 15 drought States where the bringing in of feed was extremely difficult if not impracticable.

The States in which the acute conditions required additional purchases were Arizona, Colorado, Idaho, Kansas, Missouri, Montana, Nebraska, Nevada, New Mexico, North Dakota, Oklahoma, South Dakota, Texas, Utah, and Wyoming. Within these States purchases were limited to counties where the situation was most acute, and where livestock owners were in dire distress.

By January 1, 1935, the program had resulted in the acquisition of 7,815,026 head of cattle from 675,499 farms in 24 drought States. Payment for 7,570,547 head had been certified. These certifications included \$38,032,135 in service payments and \$64,712,320 in purchase payments, or a total of \$102,744,455, as shown in table 5.

TABLE 5.—Data on emergency purchase of cattle through Dec. 31, 1934, by States

State	Number of emergency counties	Number of farms selling	Total inventory these farms	Number of cattle purchased	Number of purchased condemned	Percent of inventory purchased	Number of cattle paid for ¹	Service payments	Purchase payments	Total payments
Arizona.....	14	2,563	529,823	90,797	16,503	17.1	86,482	\$447,639	\$777,455	\$1,225,094
Arkansas.....	50	26,689	347,103	89,486	13,692	25.7	90,237	477,349	633,604	1,110,953
California.....	18	1,382	133,173	19,579	1,724	14.7	19,784	106,335	199,380	305,715
Colorado.....	63	19,023	1,194,368	276,808	36,820	23.2	260,355	1,357,870	2,360,223	3,718,093
Florida.....	7	.....	.....	16,335	1,380	.....	16,335	86,983	137,180	224,163
Idaho.....	30	4,684	184,362	38,043	6,642	20.6	33,397	169,017	244,942	413,959
Illinois.....	12	1,218	15,861	2,589	77	16.3	2,587	14,564	28,086	42,650
Iowa.....	31	4,092	91,021	18,656	1,611	20.5	18,641	93,722	171,940	265,662
Kansas.....	105	44,676	1,819,549	522,297	13,186	28.7	497,384	2,517,131	4,670,253	7,187,384
Louisiana.....	13	9,805	145,471	31,104	10,851	21.3	31,186	153,952	164,982	318,914
Minnesota.....	48	42,460	789,037	241,080	6,603	30.5	241,077	1,202,749	2,325,305	3,528,054
Missouri.....	110	92,228	1,491,269	503,717	19,261	33.8	503,443	2,623,465	4,729,226	7,352,691
Montana.....	38	13,793	636,972	338,885	7,893	53.2	339,055	1,680,161	3,181,194	4,861,355
Nebraska.....	93	63,446	2,990,018	473,687	13,273	13.8	466,009	2,303,359	4,103,393	6,406,757
Nevada.....	17	1,001	271,593	36,105	1,538	13.3	35,921	190,995	371,828	562,823
New Mexico.....	31	16,797	1,843,970	526,785	168,678	28.6	494,391	2,536,601	4,060,191	6,596,795
North Dakota.....	53	60,860	1,841,513	941,923	46,266	51.2	932,831	4,522,514	8,633,302	13,155,816
Oklahoma.....	77	29,089	1,088,770	466,135	196,277	42.8	450,702	2,240,204	2,931,941	5,172,235
Oregon.....	12	1,077	130,901	11,926	355	9.1	11,974	63,693	113,980	177,673
South Dakota.....	69	63,792	1,981,672	925,348	92,400	46.7	881,364	4,350,375	8,316,807	12,667,182
Texas.....	233	129,291	6,406,104	1,786,923	584,110	27.9	1,711,573	8,616,918	12,372,060	20,988,978
Utah.....	29	20,872	478,796	114,670	31,544	23.9	109,962	563,449	943,395	1,508,844
Wisconsin.....	19	16,078	337,991	57,980	1,491	17.5	56,881	303,350	561,368	864,718
Wyoming.....	22	10,583	1,111,491	284,548	38,682	25.6	279,635	1,407,670	2,678,277	4,085,947
Total.....	1,187	675,499	25,860,896	7,815,026	1,312,657	30.2	7,570,547	38,032,135	64,712,320	102,744,455

¹ Certified for payment through Dec. 31, 1934. (All data subject to minor revision.)

PROGRAM ACTED AS CULLING PROCESS

The Government program for cattle has served several essential purposes, and filled many pressing needs. It served as a surplus removal measure in that it relieved commercial markets of pressure of distress stock, and prevented glutting to a point that would have ruined prices for producers outside as well as within the drought areas.

At the beginning of 1934, the estimated number of all cattle on farms was 67,352,000, upward of 10,500,000 more than in 1928, the low point of the cattle-production cycle. Through the sharp reduction in numbers brought about by drought, and absorbed by the cattle-purchase program, together with the increased slaughter of cattle and calves for commercial use, it is anticipated that most of this large increase has been eliminated, and the outlook is for prices materially higher in 1935 than those that have prevailed in 1934 and other recent years.

Furthermore, the cattle-purchase program has served as a gigantic culling process, and should act to improve materially the efficiency of our beef-producing herds. Naturally, farmers faced with the necessity of selling their cattle because of feed shortage, found it advisable to make reduction in their poorer stock, and hold their better quality animals.

The emergency program recognized the necessity of maintaining breeding stock in important breeding areas, and every effort was put forth to keep liquidation in those areas at the lowest level consistent with the feed situation.

The prices offered producers in the emergency program did not encourage farmers to sell any stock that could be held, and particularly did not make enough distinction between the prices offered for good stock and those offered for poor stock to encourage farmers to dispose of quality stock which could be held. This, together with high feed prices, which stimulated farmers to keep their best animals which could utilize expensive feed more efficiently, means that the cattle industry in the drought States will have foundation stock of higher quality than ever before.

PURCHASE OF SHEEP AND GOATS

As a result of the drought, flocks of sheep came down from the mountain ranges nearly a month earlier than in normal years, and were brought into grazing areas deficient of forage. Thus the pressure on the limited feed supplies was increased.

In the middle of August, the Government launched a program for the purchase of sheep and goats, designed to salvage and convert into meat for relief purposes large numbers threatened with loss because of feed shortage. Sheep and goat producers in officially designated drought areas were offered an agreement under which they could sell ewes 1 year old or over for \$2 per head, and female Angora goats of the same age for \$1.40 per head. Half of the total payment, or \$1 per head in the case of sheep, and 70 cents per head in the case of goats, was to be made in the form of service and disposition payments, which were nonassignable and not subject to liens on the animals purchased.

TABLE 6.—Data on purchase of sheep and goats under emergency program, through Dec. 31, 1934

SHEEP (EWES) 1 YEAR OLD AND OVER

State	Number of farms selling	Inventory on farms	Number purchased	Number condemned	Percent of inventory purchased	Number paid for	Service and disposition payments	Purchase payments	Total payments
Arizona.....	95	94,284	10,609	4,662	11.2	5,880	\$5,880	\$5,880	\$11,760
Arkansas.....	14	298	95	25	31.9	94	94	94	188
California.....	162	255,534	24,151	6,804	9.5	22,764	22,764	22,764	45,528
Colorado.....	1,293	1,390,191	209,350	106,454	15.4	161,513	161,513	161,513	323,026
Idaho.....	839	1,155,580	139,021	62,649	12.0	130,968	130,968	130,968	261,936
Iowa.....	139	10,332	1,776	49	17.2	1,767	1,767	1,767	3,534
Kansas.....	122	35,727	9,693	1,714	27.1	9,546	9,546	9,546	19,092
Minnesota.....	494	25,049	6,544	168	26.1	6,553	6,553	6,553	13,106
Missouri.....	589	31,359	7,547	62	24.1	7,574	7,574	7,574	15,148
Montana.....	2,241	1,934,484	491,641	348,870	25.2	478,269	478,269	478,269	956,538
Nebraska.....	237	69,162	24,677	3,664	35.7	24,580	24,580	24,580	49,160
Nevada.....	303	764,582	99,076	9,914	12.9	97,656	97,656	97,656	195,312
New Mexico.....	1,477	1,540,842	277,649	158,765	18.0	276,160	276,160	276,160	552,320
North Dakota.....	2,701	283,014	83,571	22,337	29.5	62,083	62,083	62,083	124,166
Oklahoma.....	21	5,689	2,682	2,682	47.1	80	80	80	160
Oregon.....	558	876,253	166,369	98,458	19.0	160,088	160,088	160,088	320,176
South Dakota.....	2,465	616,335	153,784	74,564	24.9	142,222	142,222	142,222	284,444
Texas.....	10,050	4,002,428	1,097,995	824,800	27.4	1,030,114	1,030,114	1,030,114	2,060,228
Utah.....	2,034	1,594,706	206,601	121,506	13.2	178,469	178,469	178,469	356,938
Wyoming.....	1,720	2,753,059	584,976	342,922	21.2	585,894	585,894	585,894	1,171,788
Total.....	27,555	17,388,908	3,596,867	2,191,069	20.7	3,382,274	3,382,274	3,382,274	6,764,548

TABLE 6.—Data on purchase of sheep and goats under emergency program, through Dec. 31, 1934—Continued

GOATS (DOES) 1 YEAR OLD AND OVER

State	Number of farms selling	Inventory on farms	Number purchased	Number condemned	Percent of inventory purchased	Number paid for	Service and disposition payments	Purchase payments	Total payments
Arizona.....	(1)	56,534	21,395	5,134	37.8	19,839	\$13,887.30	\$13,887.30	\$27,774.60
Colorado.....	(1)	3,732	3,472	3,440	93.0	823	576.10	576.10	1,152.20
Idaho.....	(1)	139	155	155	111.5	36	25.20	25.20	50.40
Kansas.....	(1)	684	468	43	68.4	130	91.00	91.00	182.00
Missouri.....	(1)	1,248	364	315	29.2	468	327.60	327.60	655.20
Montana.....	(1)	65,464	21,294	15,950	32.5	9	6.30	6.30	12.60
Nevada.....	(1)					190	133.00	133.00	266.00
New Mexico.....	(1)					17,147	12,002.90	12,002.90	24,005.80
Oregon.....	(1)					1	.70	.70	1.40
South Dakota.....	(1)	955,022	286,929	202,956	30.1	29	20.30	20.30	40.60
Texas.....	(1)	36,904	19,669	19,608	53.1	221,763	155,234.10	155,234.10	310,468.20
Utah.....	(1)	1,087	746	746	68.6	4,363	3,654.10	3,654.10	6,108.20
Wyoming.....	(1)					746	522.20	522.20	1,044.40
Total.....		1,120,874	354,432	243,347	31.6	265,544	185,880.80	185,880.80	371,761.60

¹ Number of farms selling included with sheep report.

Through December 31, 1934, purchases of 3,596,867 sheep and 354,432 goats, from 27,555 farms in 20 drought States, had been reported. On the same date payments had been certified in connection with the purchase of 3,382,274 sheep and 265,544 goats, for a total of \$7,136,310. Of this sum, \$6,764,548 was certified in connection with the purchase of sheep and \$371,762 in connection with the purchase of goats. In both cases the total sum certified was divided equally between purchase payments and service payments.

Data on the purchases of sheep and goats, through December 31, 1934, are given in table 6.

IV. OTHER REMEDIAL MEASURES

ADJUSTMENTS AND CONSERVATION OF FEED SUPPLIES

The problem of inadequate feed supplies was approached from two directions. While an effort was being made to substitute orderly utilization for wholesale starvation of cattle, steps also were taken toward increasing feed supplies and utilizing them most efficiently.

Indication of a crop shortage as the result of the drought first became apparent in forage, feed, and pasture crops. The Administration set about to encourage planting such crops as might produce livestock feed in spite of the unfavorable growing conditions, and thus bring about an emergency expansion in supplies. Later, action also was directed toward more efficient utilization of supplies.

CONTRACT TERMS REVISED TO ENCOURAGE FORAGE PLANTING

One of the main points of attack upon the drought problem was the encouragement of increased planting of emergency forage crops. To this end, provisions of the adjustment contracts were modified, both those applying to the lands rented by the Secretary of Agriculture and those applying to other lands cultivated by contract signers.

To some extent the uses to which the rented acreages were put under the original provisions of the contract served to build up a reserve supply. Approximately 36,767,000 acres of land were withdrawn from the production of corn, wheat, cotton, and tobacco under the 1934 contracts. Withdrawals in cotton and tobacco acreages contributed over 15 million acres to this total, and since surpluses still exist in both these nonfeed crops, any of this land used for the production of pasture, meadow, and forage represented clear gain toward meeting the shortages that resulted from the drought.

Estimates indicate that under the adjustment programs 47.1 percent of the contracted acreage was devoted to new seedings of meadow and pasture crops, annual hay crops, and other erosion-preventing and soil-improving crops; 29.8 percent to feed crops for home use; 15.6 percent was fallowed; 2 percent was used for miscellaneous purposes such as weed control, farm woodlot planting, etc.; and only 5.4 percent was idle.

EMERGENCY SEEDING OF FEED CROPS

On May 19 a ruling was announced to clear the way for emergency seeding of feed crops. Under this ruling, restrictions on farms under corn and tobacco contracts in the officially designated drought area, were modified to permit planting fodder corn for roughage purposes

(not to be harvested for grain) and of forage crops for pasture or hay only, in excess of the acreage permitted under each contract. The modification did not apply to definitely contracted or rented acres which farmers had agreed to leave out of basic crop production. Neither did it apply to wheat contracts, as increases in forage crop planting under the wheat contract could be made without special ruling.

This ruling was shortly followed by two others on May 26, opening the way to pasturing livestock in the officially designated drought areas on acres contracted under the corn-hog and wheat contracts and planted to pasture crops, regardless of whether or not such pasture crops were planted with a nurse crop. The ruling extended the pasture privilege only to July 1, 1934, but later was further extended for the balance of the crop year.

On May 29 the Administration, taking cognizance of the continued growth of the drought situation, took further steps to encourage the planting of emergency forage crops, by modifying all wheat, corn-hog, and tobacco contracts in every State, removing all restrictions on planting and harvest of all forage crops, including fodder corn and grain sorghums, on all general or noncontracted acres on farms under adjustment contracts.

RULINGS GRANTED FURTHER EXTENSIONS

At the same time, the limits on the use of contracted acres were broadened to allow the planting and harvest of all forage crops, except corn and grain sorghums, and to make possible the pasturing of contracted acres and the harvest of hay for forage from such acres. Under this ruling corn, for fodder, could be planted immediately for forage purposes on noncontracted acres in all counties in the Dakotas, Minnesota, Wisconsin, Michigan, Montana, and Wyoming.

On June 23, an interpretation of the ruling of May 29 was issued, allowing the harvest of all seeds, except soybeans, cowpeas, peanuts, and sorghums, from pasture and meadow crops grown on contracted acres under the wheat, corn-hog, or tobacco contracts. This interpretation was made in view of the reduced supplies of seed, and the unfavorable condition of pasture and meadow crops for the season's harvest.

On June 30 a ruling was issued permitting the planting of corn and grain sorghums, two basic commodities, for use as roughage on contracted acres under the wheat, corn-hog, and tobacco contracts in all States. The effect of this ruling was to remove all restrictions of any character on the use, for production of forage and pasture crops, of all lands, including both contracted and noncontracted acres.

On August 2, 1934, the cotton contract was modified for 1934 to permit the planting, pasturing, and harvest of pasture, hay, and roughage crops for unrestricted use as livestock feed and for sale, on any land covered by any contract, including rented or contracted acres. A ruling also was issued at this time to allow the harvest of seed, or soybeans, cowpeas, forage sorghums, millet, Sudan grass, and meadow and pasture crops, from rented acres under the corn-hog, wheat, and tobacco contracts.

MODIFICATIONS ENCOURAGED BEST USE OF LAND

These progressive modifications in the contract limitations on use of general lands and contracted acres, encouraged the widest possible use of these lands for production of feed and forage best suited to meet the drought.

This is shown by a survey made after the removal of the forage restrictions, which indicated that 88.6 percent of the contracted acres covered by cotton, wheat, corn-hog, and tobacco contracts were used for production of forage, and that less than 4 percent of the land was idle. While the drought seriously affected new seedings of pasture and meadow crops in the Corn Belt States and States within the drought area, the contract modifications permitted and encouraged the growing of forage crops and the use of pasture on contracted acres. The modifications resulted in the production of over 14 million tons of hay and roughage on contracted acres. This supply assisted to no small extent in alleviating the deficiency in roughage caused by the drought.

Also, the supplies of grain, hay, and pasture, per unit of consuming animal, were somewhat larger than would have been the case had there been no downward adjustment in hog, cattle, and sheep numbers as a result of the adjustment programs.

EFFICIENT UTILIZATION OF FEED SUPPLIES

With the available feed supply drastically limited, the Government had several courses of action open: First, to encourage conservation and most efficient utilization of all feed available. Second, to locate regional surpluses which might exist, and to facilitate the widest possible distribution of such feeds in deficit areas. Third, to provide credit facilities for farmers with which to purchase feeds, in cases where commercial credit was not available; and in the case of producers without credit standing, to provide funds for the purchase of feed to maintain subsistence livestock.

The first and second divisions of the problem fell within the jurisdiction of the Department of Agriculture and the Agricultural Adjustment Administration. The provision of credit was the responsibility of the Farm Credit Administration. The Federal Emergency Relief Administration provided funds for feed to producers who were reduced to a relief status.

FEED AGENCY ESTABLISHED

The Federal Livestock Feed Agency was established in Kansas City in September to carry out plans for close cooperation between the Government and the livestock feed trade to assure, insofar as possible, an adequate supply of feed at equitable prices in the drought areas. Briefly, the plan provided that drought counties needing feeds of any kind consolidate all requirements and then notify the Federal Livestock Feed Agency of the nature and quantities of feeds required.

At the same time, the feed agency was making a compilation from Government surveys and reports from trade sources on supplies of feed available in surplus areas, the quantities of such feeds on hand, and the most reasonable delivered price. The agency functioned as a

clearing house to supply counties with information on the best source of supply for their particular need, taking into consideration quantity, price, location, and kinds of feed needed. The counties were thus enabled to place consolidated orders covering all county needs, and dealers in the indicated market to ship such orders direct to the counties, consigned to local dealers.

The service offered by the feed agency had resulted, up to November, in listing approximately 2,000,000 tons of hay and other roughage as available for sale and immediate delivery to the drought counties. In view of the fact that shipments of hay and feed normally run about 2 million tons annually, the volume of listings indicated to some extent the effect of the various programs.

In building up a complete information service on supplies of feeds, more than 30,000 shippers and handlers of feeds were circularized by the agency. Listings obtained are consolidated in a special feed-market news bulletin issued weekly by the Kansas City agency to all State and county drought directors, feed buyers, and farmers requesting the service.

When requests for information about feed supplies are received from feeders or county committees, complete information on supplies of feeds, relative feeding values, the price asked by the owner or handlers, the cost of freight, and the methods that may be used in obtaining the most efficient utilization of the feed in question, is made available.

CORN STOVER AND SOYBEAN HAY CONSERVATION

A systematic program designed to encourage the conservation of substitute feeds and forages was inaugurated in early September. The Agricultural Adjustment Administration announced that it would guarantee a commercial market for corn fodder and stover. By this move the Administration gave farmers in nondrought areas an incentive to harvest, cure, and prepare corn fodder and corn stover in larger quantities than are ordinarily harvested as such on Corn Belt farms. Contracts were offered to individual farmers under which the Administration agreed to purchase, at specified prices for certain grades, such corn fodder as might remain unsold on April 1, 1935. The guaranteed prices, which ranged from \$7 to \$9 per ton according to grade of product, were established to encourage producers to conserve what would ordinarily be a waste product.

Only about 86,000 tons of corn stover and corn fodder were actually contracted for, up to November. However, farmers, under the assurance given by this operation, were encouraged to conserve, it is estimated, fully 1,000,000 tons of this substitute forage, because its sale was underwritten by the Adjustment Administration.

Field representatives reported that there was a very active interest in corn fodder and stover, and that the majority of farmers who cut and shocked their corn were able to dispose of it at good prices before obtaining a commitment from the Government, or used it on their own farms in order to release alfalfa and other high-grade feeds for sale in drought areas.

PURCHASES OF SOYBEAN HAY

On August 9, it was announced that the Federal Surplus Relief Corporation would purchase from producers up to 150,000 tons of soybean hay at a price of \$15 per ton on the basis of United States Grade No. 2—a price attractive enough to stimulate the harvesting of a larger portion of the crop for hay than under ordinary conditions. For direct contact with growers, it was arranged to handle the actual acquisition and acceptance of such hay through the Soybean Marketing Association, an Illinois cooperative.

While the late fall season in the soybean area was damp and very unfavorable to the harvesting and curing of hay, the Soybean Marketing Association was able to procure approximately 35,000 tons of soybean hay for sale to the Government, provided commercial interests did not purchase it at the guarantee price or better. In December 30,000 tons of this hay was sold to the Nebraska Relief Administration, and 5,000 tons to the Missouri Relief Administration, to be used in mixed feed and distributed to livestock producers for an emergency ration.

DEFICIENCY FEED AGENCY TO IMPORT CANADIAN HAY

An agreement was completed December 24 authorizing an "agency for deficiency distribution" to carry out plans for duty-free importation of Canadian hay as a measure for alleviating the feed shortage in the Northwest States. The agency, composed of the Farmers' National Grain Corporation of Chicago, a cooperative, and two line elevator companies, will make available to farmers in the drought areas of the Northwest States possibly as much as 300,000 tons of roughages from the Canadian Provinces Alberta, Saskatchewan, and Manitoba.

The hay is to be distributed through local commercial dealers on a service-charge basis. The agreement fixes the prices to be paid for the various types and grades of hay and forage, and likewise the charges for the various operations in purchasing and shipping.

Both Canadian and United States railroads have established special reduced tariffs on the movement of these emergency forage shipments.

Surveys indicated that at least 300,000 tons of hay were available in these Canadian provinces, and that probably more could be used in the drought states. However, to underwrite the importation, the Secretary of Agriculture has agreed that in the event the agency finds it cannot dispose of 100,000 tons at the prices and under the terms specified he will take over any hay or straw remaining unsold from the first 100,000 tons, and also, after the first 100,000 tons have been sold, will take up to 50,000 tons of any forage that may remain unsold.

It was felt by officials that this plan will in no way supplant the sale of any feedstuffs in the United States, but will bring about a desirable addition to domestic stocks to assist in carrying foundation herds through the winter.

THE SEED CONSERVATION PROGRAM

The seed-conservation program was financed by a fund of \$25,000,000 for seed purchase made available by Executive order on June 23, allocating this amount from the emergency appropriations for "the purchase, sale, gift, or other disposition of seed, and for the transportation thereof."

To carry out this program, the Agricultural Adjustment Administration and the Department of Agriculture, through the seed-conservation committee, had first to determine the areas actually in danger of losing preferred varieties, and then to make careful surveys of seed deficiencies, procure the necessary seed, and conserve it for the new planting season.

PURCHASE OF ADAPTED SEED

On August 8 purchase of spring wheat, durum wheat, malting barley, feed barley, oats, and flaxseed was begun. All purchases were made after inspection and acceptance of samples submitted by the owners of the grain or their agents. All of the early purchase prices were based on daily quotations of the Minneapolis market, with a premium of a few cents per bushel paid for good seed grain.

As a general procedure the seed grain thus acquired was placed in store at country elevators throughout the drought-stricken States, but in some cases it was held at terminal markets strategically located for easy shipment to counties in which the seed would be needed.

In late November the purchase of practically all of the superior and adapted varieties was completed, and attention was turned to cleaning and processing the grain. All cleaning was supervised by specialists of the Bureau of Plant Industry.

DISTRIBUTION OF CLEANED SEED BEGAN DECEMBER 15

Distribution of the cleaned seed began on December 15. Seed is being furnished to farmers through bonded country elevators designated as the sales agents of the Government. Where local supplies are not sufficient, shipments are being made from larger terminal concentrations.

The conserved seed supplies are being sold at the purchase price as grain, plus the estimated cost of cleaning and handling.

By November 24, a total of \$14,489,000 had been expended from the original fund, and an additional \$2,505,000 had been obligated for purchases. Up to December 1 the program had resulted in the acquisition of 18,988,000 bushels of seed grain, which included 5,500,000 bushels of spring wheat, nearly 1,000,000 bushels of durum wheat, 10,000,000 bushels of oats, about 2,000,000 bushels of barley, and 400,000 bushels of flaxseed. In some cases practically all the superior quality seed available was conserved through the action of the Adjustment Administration. No distribution of the seed stocks held by the Administration is being made to areas until it is clearly apparent that the required varieties cannot be furnished at reasonable prices through regular commercial channels.

CORN OPTION PURCHASE

Another measure designed to protect seed supplies was the optional purchase of between 500,000 and 1,000,000 bushels of seed-quality corn in States where reports indicated that supplies of 1933 seed corn under seal might be threatened by the demand for feed.

Loans of 55 cents per bushel had already been advanced to farmers by the Commodity Credit Corporation on such corn under seal in such States as Kansas, Nebraska, South Dakota, Minnesota, Iowa, and Missouri. Sealed corn of seed quality was made eligible for an additional advance of 20 cents per bushel if placed under option for

sale to the Government until May 1, 1935. This corn can be drawn upon for seed by needy farmers, as growers taking advantage of the plan can obtain authorization to sell such seed corn to other farmers for planting.

EMERGENCY FREIGHT RATES

To bring feeds into the drought areas, or to ship cattle from them, at full freight rates would have represented a tremendous transportation burden on individual farmers, dairymen, and ranchers who were already suffering from the cumulative effects of the drought.

The Government, through the transportation committee, interested itself in lessening the burden of full freight rates on the emergency movement of livestock and feed. The western railroads, in cooperation with the Government, on June 6 published a general tariff of reduced rates to apply on feeds, hays, and other forages to be moved into the drought area, and on livestock to be moved out of the drought area for feeding.

The emergency rates authorized on livestock shipments allowed outshipment of foundation livestock to grazing areas at 85 percent of the normal rate, with the privilege of return shipment within a year at 15 percent of the normal rate. Thus, the return of foundation stock and future maintenance of the beef and dairy industries in the drought region was encouraged.

On grains and livestock feeds shipped into the drought counties, the rate authorized for the emergency was 66½ percent of the regular freight rates, while the tariff on hay, forage, and forage substitutes was reduced to 50 percent of the normal rate.

REDUCTIONS APPLIED ONLY TO DROUGHT SHIPMENTS

These reductions, representing concessions made by the railroads to aid agriculture in the drought areas, conditioned the availability of the emergency rates to actual drought shipments. The individual farmer, to gain advantage of the rates, must surrender certificates issued by the representatives of the Secretary of Agriculture in the drought counties.

For different reasons, curtailments have been made in the list of commodities on which reduced rates were originally accorded early in the summer. On the other hand, the territory now enjoying the benefits of reduced rates has been considerably enlarged.

Reduced rates on livestock apply to an area comprising all or portions of 23 States, and remained in effect through December 1934. Reduced rates on hay, forage, and forage substitutes will apply in the same territory until May 1, 1935.

V. DROUGHT EFFECT ON FOOD SUPPLIES

Despite the extent of the drought and its destruction of crops, the production and supplies of food for human needs of the country as a whole were ample. Early in the summer, the drought relief service undertook to determine the supplies of food actually available and their most effective use and distribution.

SURVEY SHOWS AMPLE SUPPLIES

The survey indicated that there was no severe shortage, and the publicity given these reports did much to allay the public fears regarding the food supply. In brief, the reports showed that stocks of bread grains were large, production of canning crops was about normal, fruits and vegetables were abundant outside of the drought areas, and the supply of meat, and dairy and poultry products was adequate for the remainder of the crop year.

However, local supplies of certain food crops were decidedly short in many areas, requiring more than the usual shipment from other localities. Detailed maps were prepared and furnished to the Federal Emergency Relief Administration for guidance in meeting the food needs of different localities.

To correct the supply situation, arrangements were made to inform the Relief Administration of surpluses that were tending to depress prices to farmers, and which, if no action were taken, would cause food to be lost—either through inability of farmers to harvest low-priced surplus crops, or through diversion into less efficient food uses. Thus, in many cases the relief organizations found it possible to buy the excess production of such crops for distribution to persons on relief rolls. In this way, food supplies which might otherwise have been wasted, were conserved, and through removal of the surplus supplies from local areas, incomes to farmers were increased.

VI. ORGANIZING AGAINST FUTURE DROUGHT

In August it became apparent that the effects of the drought would require certain adjustments during the next several seasons. To continue administration of emergency drought activities, and to develop plans for meeting future problems arising from the drought, an organization was established within the Government with responsibilities for planning specific parts of the long-time program and properly allocating them among various Governmental agencies. This organization is made up largely of existing units of the Department of Agriculture and the Agricultural Adjustment Administration, and the organization that operated in the early stages of the drought.

The entire set-up was under the direction of the President's drought relief committee. The livestock feed committee was created to serve as a coordinating channel for various interdepartmental functions.

The organization within the Department of Agriculture was as follows:

1. Drought plans committee, charged with recommending action to meet drought problems, and obtaining and furnishing information as a basis for recommendations and decisions of the President's drought committee. It allocates duties assigned to the Department of Agriculture to the various divisions of the Department.

2. The area designation committee, to obtain and furnish information on conditions of crops and livestock in the several States, and to recommend alterations in the officially designated drought areas.

3. The livestock purchase committee, to make recommendations, subject to the approval of the President's drought committee, regarding policy to be followed in the cattle and sheep purchase program, and the allocation of funds for such purchases among the drought-stricken States.

4. The cattle and sheep section, to carry out the actual field purchase operations in the cattle and sheep buying program.

5. Food survey committee, to determine facts on available food supplies, and to recommend steps toward the most effective use and distribution of available food.

6. Seed conservation committee, to obtain and distribute information on available seed supplies, and to make recommendations on the acquisition and distribution of seeds.

7. Feed and forage committee, to obtain and distribute information on feed supplies, and to recommend methods of conserving, assembling, and distributing feed and forage.

8. Commodities purchase section, to carry out purchase orders and donations of livestock or other commodities to the Federal Surplus Relief Corporation, procure seed stocks, feed stocks, or other commodities purchase of which has been authorized and through which all agricultural drought activities were coordinated.

9. The Bureau of Animal Industry, responsible for inspection of cattle, sheep, or other livestock to be purchased, approval of appraisals and condemnation proceedings, and acceptance of livestock purchased by the Government.

10. Extension Service, charged with administration of drought programs in the various States. The State operations are administered through the State extension services, either by the director or his designated agent, and in counties by county directors together with county committees.

COMBATING FUTURE DROUGHTS

The drought brought to the attention of the Nation the vulnerability to adverse weather conditions of certain of our agricultural areas, and gave a stimulus to building for the future to lessen this vulnerability, and to ameliorate the effects of future droughts.

Although statistical evidence is inconclusive because of the relatively short period which it covers, there seems every reason to believe that droughts will occur in the future as they have in the past. Sometimes drought conditions in certain areas are likely to last for 4 or 5 seasons, as they have during the recent drought.

The longest available rainfall records for certain stations indicate that the 1934 drought may be near the end of a long-time downward trend in precipitation that occurs at intervals of 30 to 40 years. It is, of course, impossible to determine when the upward phase of the next cycle will begin, or to forecast fluctuations in rainfall amounts that will occur from year to year.

EXPLOITATION OF LANDS AIDS DROUGHT

There is little doubt that the effects of this drought have been worse because of past, man-made changes in the areas affected. Someland has been broken up and planted to crops, when it should have been left in range. The land left in range has been quite generally overgrazed. As a consequence, wind and water erosion in the area has been growing constantly more serious. Water tables have fallen; topsoil has dried, pulverized, and blown away. As a result, the drought-stricken area was most susceptible to severe damages from the drought.

The measures now being taken to meet future drought conditions are, to a large extent, intended to counteract mistaken policies and practices that have contributed to the destructiveness of the current drought situation. These measures will tend to build up the resistance of the large semiarid agricultural area to such hazards as drought.

Large sums are being spent by Federal agencies for the purchase of submarginal land and to increase the amount of forest land. The Forest Service is contributing to this end in its program of forest improvement and conservation.

The Government program of land acquisition was accelerated during the year. This, together with the plan to establish a hundred-mile-wide strip of trees across the Great Plains area to aid in retaining soil moisture and to prevent wind erosion, is directed toward preventing the growth of conditions that make the country an easy prey to drought.

RETURNING CULTIVATED LANDS TO GRASS

Research and conservation work by numerous agencies of the Government is being devoted to the problem of restoring cultivated land to grass, protecting the soil, and preserving its productivity. Experiment stations are carrying out grass-restoration and farm-management experiments; Government control of public grazing land is invoked to prevent overgrazing; the Civilian Conservation Corps has developed some 2,500 springs and wells and has constructed hundreds of thousands of dams and terraces for conserving water and preventing soil erosion.

The drought of 1934 was more serious because of the lack of a forward-looking land policy that would have prevented the exploitation, waste, and ill-use of our land resources. Yet, the experience gained will serve to good purpose in that the Government and the people as a whole realize that not only must the damage to our lands be repaired, but also future programs must be directed and coordinated toward the purpose of establishing a better balance between cultivated and noncultivated lands, and the farmer must be protected from the effects of the droughts to come. The programs of the Agricultural Adjustment Administration, as a part of the national policy in dealing with lands, have been, and continue to be, directed toward such a purpose.

CHAPTER 3

COTTON

SALIENT FACTS ABOUT COTTON ADJUSTMENT

1. World carry-over of American cotton:		
Aug. 1, 1933-----	bales--	11, 588. 000
Aug. 1, 1934-----	do-----	10, 634. 000
Aug. 1, 1935 (estimated)-----	do-----	8, 300. 000
2. Average price received by producers per pound of lint:		
In 1932-33 crop year-----	cents--	6. 5
In 1933-34 crop year-----	do-----	9. 7
In 1934-35 crop year (preliminary estimate)-----	do-----	12. 6
3. Number of acres taken out of cotton production and made available for producing food and feed crops and for soil building:		
1933-34-----		10, 497, 000
1934-35-----		14, 603, 000
4. Total farm value of crops, plus benefits and cotton-option profits since these were distributed:		
1932-33 crop-----		\$483, 912, 000
1933-34 crop-----		\$880, 097, 000
1934-35 crop-----		\$871, 420, 000
5. Number of adjustment contracts in effect at the 1st of March 1934 (preliminary)-----		
		1, 004, 000
6. Quota of tax-exempt cotton under Bankhead Cotton Act (478-pound bales):		
1934-----	bales--	10, 460, 251
1935-----	do-----	10, 983, 264
7. Bankhead Act referendum:		
Number of voters who cast ballots in 1934-----		1, 521, 887
Percentage of voters who favored continuance of act's provisions in 1935-----		89. 4

With the 1935 cotton season, the Agricultural Adjustment Administration begins the third year of cotton adjustment.

In the 1931-32 season, beginning August 1, 1931, and again in the 1932-33 season, the world supply of American cotton was approximately 26 million bales. For the 1933-34 season the supply was 24,635,000 bales; for 1934-35 it was 20,365,000 bales.

World carry-over of American cotton, included in the world-supply figures above, was 8,868,000 bales on August 1, 1931. It rose to 12,960,000 bales on the same date in 1932, decreased slightly to 11,588,000 bales on August 1, 1933, and dropped to 10,634,000 bales in 1934. (See fig. 11.)

I. FACTORS IN DECREASE OF AMERICAN COTTON SUPPLY

Factors that have contributed to these decreases in supply and carry-over have included adjustment in production, some improvement in demand, and in 1934, because of drought, a short crop in the Southwest.

In 1933 the first cotton-adjustment program resulted in the removal from cotton production of more than 10 million acres of cotton land, preventing a record crop which would have added at least another 4 million bales to the burdensome surplus of American cotton.

The 1934 adjustment program restricted the planting of cooperating producers by about 38 percent of their base acreage. The effect of this reduction, together with that of the drought of 1934 in the Southwest which off-set the larger than average yield in the South-

east, will be to further diminish the carry-over, which is expected to be, on August 1, 1935, about 8,500,000 bales.

The objective of the 1935 program, while it contemplates a production increase over that of 1934, is to make a further reduction in the carry-over by August 1, 1936. With average growing conditions

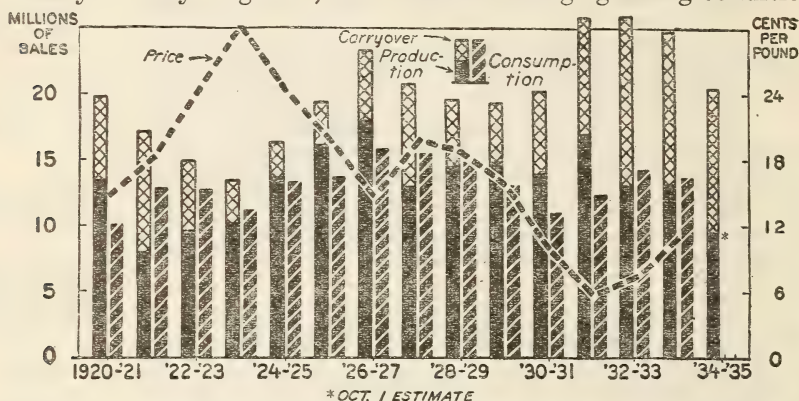


FIGURE 11.—Production, world consumption, world carry-over, and price of American cotton, 1920-21 to 1934-35.

and with the domestic and foreign consumption of American cotton that is indicated at present, the carry-over as of August 1, 1936, should be about 7,500,000 bales.

ADJUSTMENT IN 1933

Adjustment of cotton production was the objective of the first basic-crop program under the Agricultural Adjustment Act. Soon after the passage of the act, the Secretary of Agriculture and the Agricultural Adjustment Administration faced the necessity of immediate action to avert further decline in cotton prices.

The 1933 crop already had been planted and there were prospects of a 1933-34 supply of American cotton considerably larger than those of the two previous seasons.

A program was developed, in conference with representatives of cotton producers, and was announced June 19, 1933. Under its operation producers withheld from production 10,500,000 acres which, at average yields that year, would have produced 4,500,000 bales of cotton. The 1933 crop was held to 13,047,000 bales.

In consideration of their participation in this program, cotton producers to the number of 1,032,000 received in cash rentals approximately \$112,600,000. Some of these producers also received options on a quantity of Government-owned cotton, on which they have made a profit of more than \$70,000,000.

RISE IN FARM PRICE OF COTTON

The average farm price of cotton rose from 5.7 cents per pound in 1931-32, to 6.5 cents a pound for the 1932-33 crop, to 9.7 cents per pound for the 1933-34 crop, and to 12.6 cents per pound (preliminary estimate) for the 1934-35 crop. The farm value of the 1933-34 crop was \$717,000,000 as compared with \$483,912,000 for the preceding year's crop. For the 1934-35 crop it is estimated at \$756,420,000. (See figure 12). A comparison of prices received and paid by cotton farmers is shown in figure 13.

When rental and benefit payments and profits on options to producers are added, the gross return from the 1933-34 crop was approximately \$880,097,000, or an increase of about 82 percent over the

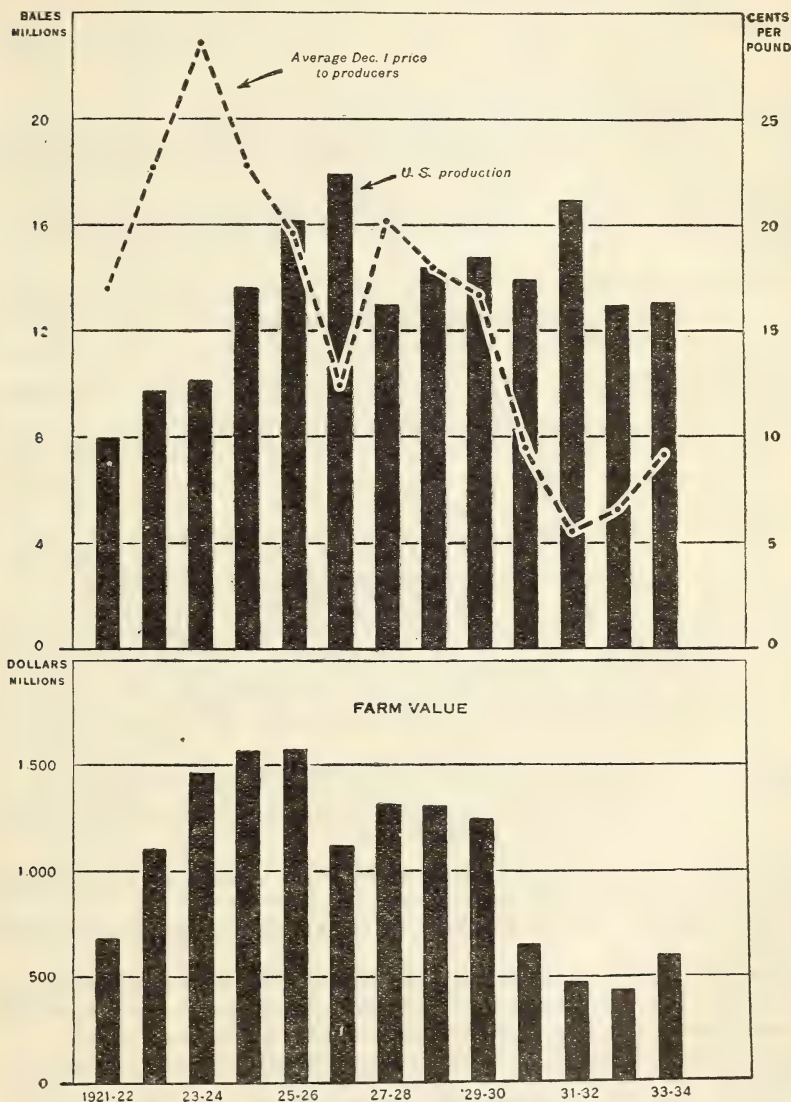


FIGURE 12.—United States production, average December 1 price to producers, and farm value of cotton, 1921-22 to 1933-34

return from the 1932-33 cotton crop. This return is estimated at \$871,420,000 for the 1934-35 production.¹ (See table 7.)

¹ December 1 estimate of production and December 1 price

TABLE 7.—Price received by producers and estimated farm value of United States cotton crop by years, 1932-33 to 1934-35

Crop year	Lint, price per pound	Seed, price per ton	Lint and seed, value per bale	Lint, farm value	Seed, farm value	Total crop, farm value	Rental parity payments and option profits	Total farm value plus payments and option profits
	<i>Cents</i>	<i>Dollars</i>	<i>Dollars</i>	<i>Dollars</i>	<i>Dollars</i>	<i>Dollars</i>	<i>Dollars</i>	<i>Dollars</i>
1932-33-----	6.5	10.36	37.42	424,132,000	59,880,000	483,912,000	-----	483,912,000
1933-34-----	9.7	14.43	55.35	633,266,000	83,741,000	717,007,000	163,090,258	880,097,258
1934-35-----	12.4	35.64	78.93	602,314,000	154,106,000	756,420,000	115,000,000	871,420,000

¹ Based on Bureau of Agricultural Economics reports on farm prices and production as of Dec. 1, 1934. This method usually results in a lower total estimate than use of the weighted average price for the crop year.

The unusually high acre yield in 1933, notwithstanding the reduction in acreage, brought about a world supply of American cotton in the 1933-34 season that totaled 24,635,000 bales. For the same

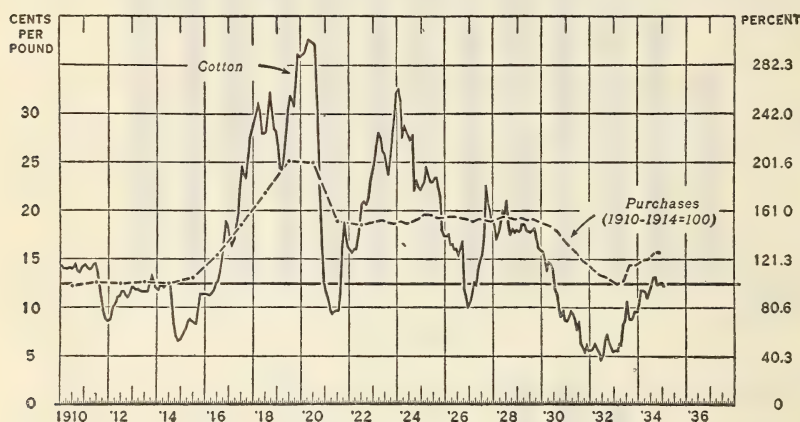


FIGURE 13.—Farm price of cotton and index numbers of prices paid by farmers, 1910 to 1935.

season the world supply of all growths, both American and foreign, was 42,135,000 bales, the highest on record.

It was evident that an oversupply of threatening proportions still existed.

A series of conferences throughout the Cotton Belt resulted in the conclusion that adjustment of cotton production should continue because there was still a burdensome surplus of American cotton.

Accordingly, the basis of the second cotton-adjustment program was developed.

THE 1934 PROGRAM

On September 22, 1933, the Secretary of Agriculture announced details of a cotton-adjustment program which was to include the 2 crop years 1934-35 and 1935-36.

The plan contemplated a 2-year voluntary agreement with producers. The base acreage used in the program was the average cotton acreage in cultivation during the 5-year period 1928-32, except on farms where cotton production had been begun later than 1928.

Under the agreement, a producer would obligate himself to rent to the Secretary of Agriculture in 1934 between 35 and 45 percent of his base cotton acreage. He would further agree to rent to the Secretary in 1935 not more than 25 percent of his base cotton acreage, if the Secretary should elect to continue the adjustment program in the 1935-36 season.

For the land rented to the Secretary of Agriculture in 1934, contracting producers were to receive rental payments at the rate of 3.5 cents per pound of cotton which might have been produced thereon, as determined by the average yield of cotton land during the base period.

In addition, they were to receive a parity payment of 1 cent per pound on 40 percent of their base production. This proportion, it was estimated, represented that portion of total American production that ordinarily moves into domestic production for domestic consumption.

THE SECOND SIGN-UP CAMPAIGN

The second sign-up campaign, in which cotton farmers were offered the 2-year contracts, began January 1, 1934. The county production control associations, of which growers had become members in 1933 upon signing the 1933 contracts, presented the new contracts to growers.

In each county a committee of three persons, selected by the county association and working with the county extension agent, supervised the general organization of the campaign.

A community committee was selected for each 300 farms or fraction of that number within the county. Members of these committees were contract signers selected by the county association. Committeemen not only performed administrative work, but cooperated with county extension agents and with teachers of vocational agriculture in giving growers information on the cotton situation in the United States and in the world.

The county committees assembled and checked contracts, adjudicated disputes, and worked with individual producers in developing production records essential to execution of the contracts.

When each county committee had completed its work it forwarded its summary forms to a State board of review, appointed by the State director of extension with the approval of the Cotton Section of the Agricultural Adjustment Administration.

When approved by the State board of review, the contracts were forwarded to Washington for individual acceptance and to be audited for payment.

PROGRAM MADE EFFECTIVE

On February 15, 1934, the Secretary of Agriculture announced that a sufficient number of producers had signed contracts to make the program effective. At that time State offices had reported about 1 million contracts presented, offering to rent to the Secretary approximately 15 million acres of cotton land.

The number of contracts for 1934 received and accepted, and the payments by States, are shown in table 8. A small number of individual cases are still in suspense pending some final adjustment, but final totals by States will not be materially different from those shown in the table.

TABLE 8.—*Preliminary statement of results of 1934 cotton-acreage adjustment program*

State	Contracts received	Cases approved for payment as of Dec. 20, 1934	Payments as of Dec. 20, 1934				Estimated balance to be paid
			First	Second	Parity	Total	
	<i>Number</i>	<i>Number</i>	<i>Dollars</i>	<i>Dollars</i>	<i>Dollars</i>	<i>Dollars</i>	<i>Dollars</i>
Alabama.....	123, 697	122, 209	3, 966, 699	3, 492, 717	714, 694	8, 174, 110	2, 071, 129
Arizona.....	1, 852	1, 777	364, 926	294, 505		659, 431	292, 751
Arkansas.....	91, 628	90, 347	4, 331, 239	3, 446, 208	806, 155	8, 583, 602	2, 637, 843
California.....	1, 876	1, 860	479, 208	339, 812		819, 020	447, 929
Florida.....	6, 498	6, 383	108, 496	94, 021	9, 004	211, 521	83, 227
Georgia.....	106, 861	106, 605	3, 818, 320	3, 305, 673	740, 460	7, 864, 453	2, 072, 609
Kansas.....	20	15	644			644	1, 021
Kentucky.....	290	287	24, 891	17, 393		42, 284	22, 409
Louisiana.....	56, 108	55, 229	2, 397, 745	2, 017, 361	475, 473	4, 890, 579	1, 325, 452
Mississippi.....	95, 618	94, 812	4, 823, 573	4, 061, 866	375, 752	9, 261, 191	3, 303, 660
Missouri.....	8, 780	8, 521	704, 059	403, 527	8, 653	1, 116, 239	771, 371
New Mexico.....	2, 158	2, 065	262, 672	187, 107	55, 910	505, 689	189, 862
North Carolina.....	70, 477	69, 699	2, 147, 595	1, 748, 683	189, 714	4, 085, 992	1, 503, 663
Oklahoma.....	87, 223	84, 663	3, 156, 619	2, 508, 511	564, 247	6, 229, 377	1, 949, 870
South Carolina.....	72, 275	70, 686	2, 640, 670	2, 329, 174	313, 139	5, 282, 983	1, 595, 860
Tennessee.....	39, 015	38, 661	1, 443, 806	1, 164, 347	130, 035	2, 738, 188	1, 011, 570
Texas.....	235, 265	232, 706	13, 196, 385	11, 234, 659	1, 351, 716	25, 782, 760	8, 715, 496
Virginia.....	4, 526	4, 454	111, 837	68, 618	11, 953	192, 408	97, 238
United States.....	1, 004, 167	990, 979	43, 979, 384	36, 714, 182	5, 746, 905	86, 440, 471	28, 092, 960

II. THE BANKHEAD ACT

In 1934 when cotton farmers were signing contracts to reduce their plantings for the next two seasons, there developed a strong sentiment in favor of a supplementary type of production control that would prevent noncooperating farmers from increasing their own plantings in order to capitalize upon the price advances that had resulted from the reductions made by contract signers. Prices had quickly responded to the adjustment of production in 1933, and to the revaluation of the dollar.

Increased planting by noncooperating growers would tend to nullify the effectiveness of the adjustment measures, it was urged.

Temptation was strong for new producers to go into cotton production, and in certain areas for farmers who had been shifting from cotton to other crops under the stimulus of higher prices to expand their cotton acreage.

There was also reported a tendency toward more intensive cultivation.

Throughout the South there was a widespread belief that these factors, together with the increase in farm population because of the migration of city people to farms in the South, might seriously impede the efforts of the Agricultural Adjustment Administration.

In response to this sentiment there was introduced in Congress a bill later commonly referred to as the Bankhead Act, designed to use Federal powers to hold total cotton production to a fixed national quota.

QUESTIONNAIRES TESTED OPINION IN COTTON BELT

While this bill was pending in January 1934, the Secretary of Agriculture sent more than 40,000 questionnaires to representative cotton producers and other persons able to gauge farm sentiment on the compulsory features embodied in this type of legislation.

The 24,789 questionnaires returned indicated overwhelmingly the desire of the producers for some form of compulsory control to supplement the voluntary agreements made under the Agricultural Adjustment Act.

Congress passed the Bankhead Act, which was approved April 21, 1934. The effective period of the act was limited to 1 crop year (defined in the act as June 1, 1934, to May 31, 1935) unless the President should find that the continuation of the act was necessary to meet the emergency in cotton production and marketing, in which case it should become effective for the succeeding crop year, provided the Secretary of Agriculture should find that two-thirds of the cotton producers favored the levy of a tax on cotton produced in excess of a total national quota.

PROVISION OF BANKHEAD ACT

The Bankhead Act provided that, for the 1934-35 season, 10 million bales (500 pounds net weight, equivalent to 10,460,251 bales of 478 pounds, net weight) could be ginned and marketed free of a tax that was fixed in the act as 50 percent of the average central market price of $\frac{3}{8}$ -inch Middling spot cotton, but in no event less than 5 cents per pound. The Secretary determined the rate of the tax to be 5.67 cents per pound of lint.

The act exempts from tax cotton of $1\frac{1}{2}$ -inch staple length; and cotton produced on land owned by Government-owned agricultural experiment stations; an amount of cotton harvested on each farm equal to its allotment; and cotton harvested prior to the crop year 1934-35.

The Agricultural Adjustment Administration was designated to administer the act, which provided that the national quota was to be divided among the cotton-producing States on the basis of their production during the period 1928-32. The State quotas were then to be allocated among counties on the same basis, and the county allocations to be allotted among individual farms by application of the same formula.

In county figures, allowances were to be made for years in which extraordinary damage had been caused by weather or other natural factors.

STATE QUOTAS UNDER BANKHEAD ACT

Table 9 shows in bales of 478 pounds, net weight, the State quotas of tax-exempt cotton established under the Bankhead Act for the 1934-35 season.

The administration of the Bankhead Act was decentralized as much as possible. In each State a State allotment board of at least three members was appointed by the State director of Cooperative Extension Service with the approval of the Agricultural Adjustment Administration. The duties of this board were to compute allotments and to issue tax-exemption certificates on the basis of information submitted in applications from the cotton producers in each county, after these applications had been approved by the county committees.

TABLE 9.—*State quotas of tax-exempt cotton for 1934 under provisions of the Bankhead Act*

State	5-year average production 1928-32		Allotment in terms of net pounds, lint	Allotment in 478-pound net weight bales
	478-pound net weight bales	Net lint		
	<i>1,000 bales</i>	<i>1,000 pounds</i>	<i>Pounds</i>	<i>Bales</i>
Virginia.....	45	21, 598	15, 211, 200	31, 823
North Carolina.....	752	358, 857	252, 715, 200	528, 693
South Carolina.....	856	408, 763	287, 856, 000	602, 209
Georgia.....	1, 242	593, 688	418, 084, 800	874, 654
Florida.....	35	16, 757	11, 798, 400	24, 683
Illinois.....	-----	-----	328, 500	687
Kansas.....	-----	-----	180, 500	378
Kentucky.....	-----	-----	3, 057, 400	6, 396
Tennessee.....	478	228, 827	161, 145, 600	337, 125
Alabama.....	1, 255	600, 290	422, 731, 200	884, 375
Mississippi.....	1, 559	745, 781	525, 192, 000	1, 098, 728
Louisiana.....	745	356, 376	250, 963, 200	525, 028
Texas.....	4, 580	2, 197, 538	1, 547, 539, 200	3, 237, 530
Oklahoma.....	1, 109	531, 228	374, 097, 600	782, 631
Arkansas.....	1, 351	646, 643	455, 376, 000	952, 669
New Mexico.....	90	43, 234	30, 446, 400	63, 695
Arizona.....	128	61, 454	43, 276, 800	90, 537
Minor States (Illinois, Kansas, and Kentucky).....	11	5, 061	-----	-----
Total excluding California and Missouri.....	14, 236	6, 816, 095	4, 800, 000, 000	10, 041, 841
California.....	-----	-----	100, 000, 000	209, 205
Missouri.....	-----	-----	100, 000, 000	209, 205
Grand total.....	14, 236	6, 816, 095	5, 000, 000, 000	10, 460, 251

Within the counties, the act was administered by the cotton production-control associations organized under the program of the Agricultural Adjustment Administration. A bonded county assistant in cotton adjustment was employed in each county in which cotton was produced on 250 or more farms. This assistant worked with the county association, assisted in keeping records, received applications for tax exemption certificates and forwarded them to the State allotment board, received tax-exemption certificates from the State allotment board and delivered them to the producers to whom they were allotted.

TRANSFER OF TAX-EXEMPTION CERTIFICATES

After certificates had been distributed to approximately 2,500,000 cotton farmers and landowners, it became apparent, because of variations from normal yields in 1934, both within regions and within counties, that many producers would have exemption certificates covering more cotton than they would have to sell, while other producers would have cotton in excess of their allotments.

The exemption certificates were transferable. In the Southwest, because of the drought, large numbers of producers had surplus certificates which they wished to sell, while in other areas producers were willing to buy the certificates in order to market cotton which they had produced in excess of their allotments.

NATIONAL POOL ORGANIZED

On September 5, 1934 a national pool was organized by the Secretary of Agriculture to provide facilities for the transfer of the certificates. Four cents per pound of lint, approximately 70 percent of the tax on excess cotton, was fixed as the price at which the certificate would be sold by the pool.

The county assistants were instructed to receive certificates and trust agreements from producers and transmit them to the manager of the certificate pool at Washington, and to receive orders from producers who desired to purchase certificates. Such orders were filled as rapidly as surrender of certificates was reported.

Surrendered certificates were canceled, and new ones were issued to county assistants for distribution among producers who had forwarded funds for their purchase.

Funds received from the sale of the new certificates were deposited in the United States Treasury in a special account, to be distributed among producers who had surrendered certificates, upon the liquidation of the pool. Within individual counties, many additional transfers were made.

The transfer of certificates constituted a form of crop insurance for some farmers whose production had been adversely affected by weather or other natural factors. They were entitled to receive funds from the sale of their certificates, or retain the certificates for use in the 1935-36 season, in marketing cotton in excess of their allotments for that season.

Table 10 shows the status of the surplus certificate pool as of December 31, 1934.

TABLE 10.—*Status of surplus certificate pool as of Dec. 31, 1934*

State	Pounds surrendered	Sales			
		Audited	Not audited	Total	Pounds sold
Alabama.....	957,355	\$1,352,360.48	\$92,838.34	\$1,445,198.82	36,129,970
Arizona.....	1,061,310	66,075.88	11,545.80	77,621.68	1,940,542
Arkansas.....	44,594,720	831,002.29	77,909.81	908,912.10	22,722,803
California.....	166,155	375,260.36	32,241.42	407,501.78	10,187,544
Florida.....	474,035	69,799.43	3,188.62	72,988.05	1,824,701
Georgia.....	3,393,300	1,508,039.10	300,807.04	1,808,846.14	45,221,153
Illinois.....		37,102.30	10,450.68	47,552.98	1,188,825
Kansas.....	28,805				
Kentucky.....		106,690.20	24,829.40	131,519.60	3,287,990
Louisiana.....	16,601,130	295,224.73	3,024.60	298,249.33	7,456,233
Mississippi.....	5,376,065	991,743.14	180,514.97	1,172,258.11	29,306,453
Missouri.....	763,400	308,374.66	126,976.17	435,350.83	12,133,771
New Mexico.....	757,730	374,157.24	29,562.20	403,719.44	10,092,986
North Carolina.....	224,370	1,525,923.46	198,805.35	1,724,778.81	43,119,470
Oklahoma.....	156,966,555	97.20		97.20	2,430
South Carolina.....	1,455,025	1,262,650.19	98,110.76	1,360,760.95	34,019,024
Tennessee.....	36,035	890,787.15	208,002.79	1,098,789.94	27,469,749
Texas.....	347,693,845	1,405,965.80	129,575.17	1,535,530.97	38,388,274
Virginia.....	37,845	53,725.18	10,213.00	63,938.18	1,598,455
Total.....	580,587,730	11,504,968.79	1,538,646.12	13,043,614.91	326,090,373

Total pounds surrendered, 580,587,730.

Total pounds audited, 273,693,830.

Total pounds to be audited, 306,893,900.

THE BANKHEAD REFERENDUM

The method of determining whether the provisions of the Bankhead Act should be continued in effect in the 1935-36 season was suggested in the act itself. There was little question that, in spite of the progress already made in adjusting supplies, the emergency in cotton production and marketing had not yet ended.

The act provided that its terms could be made effective for the second season only if the Secretary of Agriculture found that two-thirds of those engaged in the production of cotton favored the use of the tax.

It was determined that a referendum among cotton farmers should be held on December 14, 1934, to provide a basis for the Secretary's finding.

The balloting was secret and was conducted by local committees at more than 8,000 polling places. Referendum committees were instructed to conduct the voting in such a manner that all eligible producers should have full opportunity to express their choice.

Table 11 shows, by States, the votes cast for and against the continuation of the provisions of the Bankhead Act.

TABLE 11.—Official tabulation of returns from Bankhead referendum

State	Votes for act	Votes against act	Total	Percentage in favor
Alabama.....	217, 275	11, 426	228, 701	95.0
Arizona.....	1, 165	452	1, 617	72.0
Arkansas.....	121, 933	9, 496	131, 429	92.8
California.....	1, 949	1, 075	3, 024	64.5
Florida.....	8, 691	639	9, 330	93.2
Georgia.....	126, 974	19, 372	146, 346	86.8
Illinois.....	199	46	245	81.2
Kansas.....	53	30	83	63.8
Kentucky.....	1, 189	411	1, 600	74.3
Louisiana.....	105, 530	2, 971	108, 501	97.3
Mississippi.....	205, 219	6, 500	211, 719	96.9
Missouri.....	10, 552	1, 914	12, 466	84.6
New Mexico.....	1, 972	787	2, 759	71.5
North Carolina.....	118, 889	9, 704	128, 593	92.5
Oklahoma.....	46, 397	30, 457	76, 854	60.4
South Carolina.....	81, 485	5, 783	87, 268	93.4
Tennessee.....	62, 732	8, 150	70, 882	88.5
Texas.....	241, 018	51, 051	292, 069	82.5
Virginia.....	8, 125	276	8, 401	96.7
United States.....	1, 361, 347	160, 540	1, 521, 887	89.4

BANKHEAD ACT QUOTA FOR 1935

Section 3 of the Bankhead Act provides that the Secretary of Agriculture shall ascertain, from investigation of the available supply of cotton and the probable market requirements, what quantity of cotton should be allotted in accordance with the policy of the act, to be marketed in the channels of interstate and foreign commerce from production of cotton during the 1935-36 season free from tax.

This quantity was ascertained by the Secretary, after the referendum among cotton growers, to be 10,500,000 bales of 500 pounds of lint cotton.

Establishment of this national quota is expected to make it possible to reduce further the carry-over of American cotton as of August 1, 1936, and likewise to permit signers of voluntary contracts under the Agricultural Adjustment Act to obtain, insofar as possible, 100 percent exemption for an average production in 1935.

Data on which the 1935 Bankhead allotment was calculated are shown in table 12.

TABLE 12.—Data on which 1935 allotment under Bankhead Act was calculated

[In millions]

Item	Estimated acreage ¹		Estimated production ³		Bankhead allotment	
	Planted	Harvested ²	478-pound bales	500-pound bales	478-pound bales	500-pound bales
Desirable 1935 acreage, production, and allotments.....	32.18	31.41	11.500	10.994	10.983	10.500
Estimated acreage to be planted under contract.....	28.28	27.61	10.105	9.661	9.891	9.456
Estimated acreage to be planted not under contract.....	2.90	2.83	1.037	.991	.680	.650
Estimated acreage to be planted on "new" land.....	.70	.68	.250	.239	.164	.157
Estimated increase on "2-bale" farms.....	.30	.29	.108	.103	.108	.103
Excess production permitted under act in Missouri and California.....					.140	.134
Total estimated acreage production and 1935 allotments.....	32.18	31.41	11.500	10.994	10.983	⁴ 10.500

¹ Assumes contract signers will reduce on an average, 33 percent from their established base.

² Assumes an average abandonment of 2.4 percent of the planted acreage.

³ Assumes an average yield of 175 pounds of lint cotton per acre.

⁴ Providing exemption certificates are issued to cover 10,500,000 bales of 500 pounds each in 1935, there will be available, including the 700,000 exemption certificates held over from the 1934 program, sufficient certificates to cover 11,169,000 bales of 500 pounds or 11,683,000 bales of 478 pounds.

After announcement of the 1935 national quota, tentative allotments to the cotton-producing States were made as shown in table 13.

TABLE 13.—Tentative allotments of tax-exempt ginnings of cotton to States, under 1935 Bankhead plan

State	5-year average production (1928-32)		Allotment in terms of net pounds of lint	Allotment in equivalent 478-pound weight bales
	Equivalent 500-pound gross weight bales	Net lint		
	<i>1,000 bales</i>	<i>1,000 pounds</i>	<i>Pounds</i>	<i>Bales</i>
Virginia.....	45	21,598	16,001,700	33,476
North Carolina.....	752	358,857	265,871,900	556,218
South Carolina.....	856	408,763	302,846,600	633,570
Georgia.....	1,241	593,210	439,500,700	919,458
Florida.....	35	16,757	12,415,000	25,973
Illinois.....	1.0	466	345,000	722
Kansas.....	.5	256	189,800	397
Kentucky.....	9.1	4,339	3,215,000	6,726
Tennessee.....	479	229,305	169,888,700	355,416
Alabama.....	1,255	600,363	444,800,200	930,544
Mississippi.....	1,559	745,781	552,538,300	1,155,938
Louisiana.....	745	356,376	264,033,800	552,372
Texas.....	4,580	2,197,538	1,628,124,000	3,406,117
Oklahoma.....	1,109	531,228	393,579,100	823,387
Arkansas.....	1,351	646,643	479,088,400	1,002,277
New Mexico.....	90	43,234	32,051,400	67,011
Arizona.....	128	61,454	45,530,400	95,252
Total excluding California and Missouri.....	14,236	6,816,168	5,050,000,000	10,564,854
California.....	260	95,781	100,000,000	209,205
Missouri.....	229	109,717	100,000,000	209,205
Grand total.....	14,665	7,021,666	5,250,000,000	10,983,264

III. THE 1935 PROGRAM

When the 1935 program was developed, total world supplies of American cotton amounted to 20,365,000 bales for the 1934-35 season, a figure nearer normal levels than it had been at any time during the preceding 4 years.

However, the carry-over of 10,634,000 bales on August 1, 1934, was still excessive, and although it was evident the carry-over would be further reduced by August 1, 1935, it was determined to be to the best interests of cotton farmers to continue efforts to further reduce the carry-over.

Approximately 1,004,000 producers had signed the 2-year contract in 1934. Their total base acreage approximated 38,210,000 acres.

Under these contracts the maximum rate of reduction that could be required in 1935 was 25 percent. One section of the 1934-35 cotton-acreage-reduction contract provided that the contracting producer agree to reduce the acreage planted to cotton on the farm in 1935 by an amount not to exceed 25 percent below the base acreage.

Accordingly, on November 28, 1934, the Secretary of Agriculture and the Administrator of the Agricultural Adjustment Act announced that the maximum reduction of 25 percent from the base acreage would be made effective for 1935, and the Secretary of Agriculture signed a proclamation making that rate of reduction effective for all contracts.

REDUCTION BY 35 PERCENT AUTHORIZED

Subsequently, it was decided that producers participating in the program under voluntary agreements would be permitted to rent to the Secretary of Agriculture as much as 35 percent of their base acreage and receive benefit payments thereon.

Giving producers the opportunity to reduce their acreage by 35 percent was for the purpose of continuing the effort to reduce the carry-over, and at the same time permit the contract to be adjusted so as to correspond as nearly as possible with individual allotments under the Bankhead Act.

Producers who did not sign the 2-year contracts early in 1934 will be offered special 1-year contracts covering the 1935-36 season.

PAYMENTS ON SAME BASIS AS IN 1934-35

Under the terms of the contracts covering the 1935-36 season, payments will be similar to those made under the contracts for the 1934-35 season.

An increase of one-fourth cent per pound in the "parity payment" was authorized. Thus the basis of the 1935 contracts is: $3\frac{1}{2}$ cents per pound on the average yield for the rented acreage during the base period, 1928-32; and $1\frac{1}{4}$ cents per pound on the farm allotment, which is equal to 40 percent of the cooperating producer's average production for the base period, and represents that portion of the national production which ordinarily moves into domestic consumption.

It is estimated that producers will receive a total of approximately 130 million dollars in rental and benefit payments under the 1935 program.

ANTICIPATE 1935 CROP OF 11,500,000 BALES

It was estimated that with the Bankhead Act in effect, and with a program providing for a 35-percent reduction from the base acreage of cooperating producers, including those signing the 1-year contract, a total crop of about 11,500,000 bales could be expected in 1935 with average yields.

This calculation assumed that, because of the offer of 1-year contracts to producers who had not signed the 2-year contracts, the total base acreage would be increased to about 42,210,000 acres.

A 35-percent reduction from this base would leave approximately 27,440,000 acres planted by cooperating producers. If the net reduction of cooperating producers were only 33 percent, the total planted acreage of cooperating producers would approximate 28,280,000 acres.

It was estimated that acreage planted by nonsigners, new lands that might be developed, and additional acreage released through exemptions to producers whose base production is two bales or less would, under the 1935 program, not exceed 3,900,000 acres.

Allowing for these factors and assuming a net 33 percent reduction by cooperating producers, total planted acreage in 1935 would amount to about 32,180,000 acres. With average abandonment this would leave for harvest about 31,410,000 acres. With average yields of 175 pounds of lint per acre this acreage would give a total production of about 11,500,000 bales in 1935.

EXPORTS OF AMERICAN COTTON

In developing the 1935 cotton program the effects of adjustment on exports of American cotton were carefully considered.

There has been a marked decline in cotton exports from the United States since August 1, 1934. In that month exports of cotton were 83 percent of the 10-year August average for 1923-33, and the monthly averages from September to December 1934 ranged from 50 to 60 percent of the corresponding 10-year averages.

On the other hand there has been a smaller decline in foreign consumption of American cotton than in export movement since August 1, 1934. Exports in the 4-month period, August 1 to November 30, 1934, declined 2,055,000 bales, or about 42 percent, from the exports in the corresponding period in 1933. In the same period, estimated foreign consumption of American cotton declined 983,000 bales, or only 23 percent. It is evident foreign mills have been filling part of their current requirements from stocks of American cotton, which had been accumulated in foreign countries.

Three other factors appear to have contributed to the decrease in exports of American cotton since the beginning of the 1934-35 season. They are:

1. Relatively high spot-cotton prices.
2. Reduced dollar exchanges available abroad.
3. Some increase in foreign production of cotton.

Spot-cotton prices, with relation to distant futures, continued high for the first 5 months of the 1934-35 season tending to cause traders and foreign consumers to defer purchases. Reduced production and the withholding of cotton from the market by farmers who obtained a 12-cent loan under the terms of the Commodity Credit Corporation contract combined to support this high level of spot

prices which handicapped the normal merchandising of cotton, during that period.

Reduced dollar exchange abroad has been perhaps the most serious impediment to the usual export movement of cotton.

During the 1933-34 season foreign purchases were facilitated by extraordinarily large shipments of gold to the United States. This and other means of financing cotton exports without accepting corresponding imports appear to be reaching an end.

CURRENCY POLICIES ARE FACTORS

An important factor in the increase of cotton prices and in the export movement of cotton during 1933-34 was the revaluation of the dollar.

Through the revaluations of foreign currencies, foreign countries have likewise increased the prices received by their cotton producers.

On the basis of spot prices quoted at Liverpool, which presumably reflect spot prices of cotton in India and Egypt, most of the increases which have occurred thus far in the prices of Indian and Egyptian cotton took effect before the inauguration of the cotton-adjustment program in this country. In fact, the very short staple cottons produced in India under the trade names Bengal and Sind were even lower in December 1934 than during the first 3 months of 1933.

Table 14 shows the percentage changes in Liverpool prices of several descriptions of Indian cotton and Egyptian Uppers from their respective averages for the 7 weeks before September 21, 1931, when Great Britain went off the gold standard, to the average for the first 3 months of 1933, and from the latter period to December 14, 1934. Changes in prices of American cotton are shown for comparative purposes, but since changes in the Liverpool prices do not reflect changes to American growers the changes in prices of American Middling in the 10 spot markets of the United States are also included.

TABLE 14.—*Spot-price changes in foreign and American descriptions of cotton at Liverpool, in relation to changes in monetary policies*

Description of cotton	Percentage change in price	
	From the summer of 1931 to the first 3 months of 1933	From the first 3 months of 1933 to Dec. 14, 1934
Egyptian, Fully Good Fair Uppers.....	41-percent increase.....	16-percent increase.
Indian, Fully Good Broach.....	50-percent increase.....	21-percent increase.
Indian, Fine Oomra No. 1.....	48-percent increase.....	12-percent increase.
Indian, Fully Good Bengal.....	47-percent increase.....	10-percent decrease.
American Middling, Fair Staple.....	34-percent increase.....	39-percent increase.
American Middling, $\frac{3}{8}$ -inch (10 spot markets, United States).....	4-percent decrease.....	109-percent increase.

It would appear that much of the recent increase in foreign acreage may be largely attributed to currency depreciation and previous production decreases in foreign countries, which were not duplicated in the United States until 1933.

RELATION OF U. S. PRODUCTION TO FOREIGN ACREAGE

Although increased prices and reduced supplies of American cotton benefit foreign producers and may have some tendency to increase production and consumption of foreign cotton, the production-control programs in the United States apparently have made no important addition to production and consumption of foreign cottons. Other factors have shown a much more marked tendency to increase cotton acreages abroad.

From the low point reached during the early post-war period, foreign cotton production rose sharply when boll weevil depredations caused short crops and extremely high prices for American cotton. During the 3 years 1928-29 to 1930-31, foreign production of cotton averaged approximately 12,000,000 bales annually. (See figs. 14 and 15.)

During 1931-32, largely because of low yields, and during 1932-33, largely because of reduced acreage and slightly-below-average yields, foreign production averaged only about 10,500,000 bales.

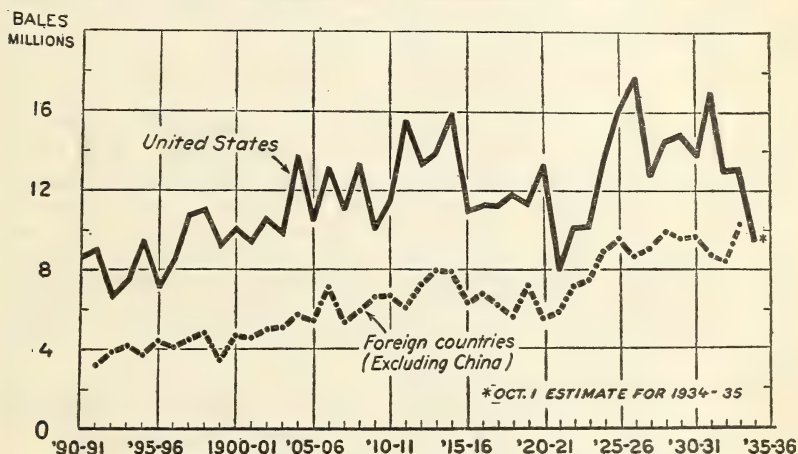


FIGURE 14.—Cotton production in the United States and in foreign countries 1890-91 to 1935-36

In 1933-34 foreign cotton acreage increased about 9 percent and production increased about 22 percent, reaching a total of approximately 13,000,000 bales. As compared with this increase of 9 percent in foreign acreage the planted acreage in the United States increased 12 percent in 1933.

INCREASES ABROAD PRECEDED UNITED STATES PROGRAM

The 1933 cotton-reduction program in the United States did not get under way until early summer, after increased acreages abroad already had been planned or planted.

Available data on foreign production in 1934-35 indicate that increases in some countries have been about offset by decreases in others, so that the total is not likely to show material change from the foreign production of the 1933-34 season.

Available information, including reports from representatives of the Department of Agriculture who have studied the situation in

foreign countries, indicates that it is very unlikely that foreign commercial cotton acreage could expand by as much as 10,000,000 acres in the next 5 years, compared with approximately 32,000,000 acres, the average for the 10-year period, 1921-22 to 1932-33.

In fact, even if recent relatively active demands for foreign cottons should continue and even if there is no concerted international action to

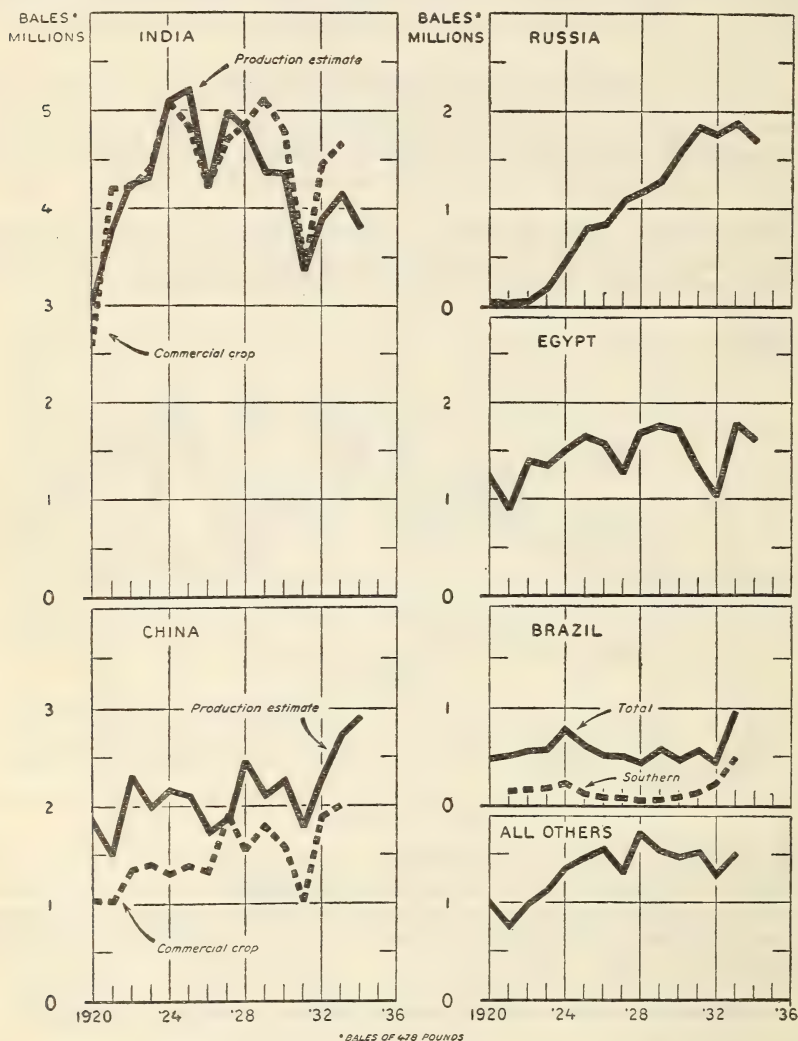


FIGURE 15.—Cotton production in foreign countries, 1920 to 1935

obtain stability of production and marketing, it is improbable that there would be an increase of as much as 5 million acres in foreign production in the next 5 years. The continuation of the present cotton acreage adjustment program in the United States would not be likely to bring about such a further expansion in foreign production as would seriously interfere with American cotton's dominance of foreign markets.

INFORMATIONAL PROGRAM

The Agricultural Adjustment Administration has cooperated with already established educational agencies in supplying producers with information. It was realized that if the cotton program were to succeed it would not only have to be economically sound, but it would require the support of cotton producers, based upon a knowledge of the cotton situation both in the United States and in foreign countries.

The Cooperative Extension Service has worked with the Adjustment Administration in keeping producers informed. In addition to performing duties incident to administration of the adjustment program, county agents and other extension workers have conducted district, county, and community informational meetings with cotton producers. They have also supplied material and assistance to members of the county cotton control associations, in conducting meetings in their own communities.

Between September 1, 1934, and December 15, 1934, over 12,500 community meetings were conducted by county agents and committeemen with a total attendance of more than 855,000. At these meetings five cotton information leaflets, a number of wall-size statistical charts, and the mimeographed publication, Cotton Production Adjustment, prepared by the Adjustment Administration, were used.

The white and colored teachers of vocational agriculture in the Cotton Belt have also cooperated in supplying producers with information. A preliminary estimate indicates that vocational teachers conducted from 2 to 5 cotton information meetings per teacher between July 1934 and December 15, 1934. Vocational teachers between July and December 1934 conducted 18,000 community meetings on cotton with a total attendance of 750,000. Teachers of vocational agriculture were not charged with the responsibility of administration of the program and were in a position to present all of the facts for and against the program. In the majority of cases they included cotton information as a regular part of their class work with high-school boys and in their evening classes with adult farmers.

IV. THE COTTON PRODUCERS' POOL

Cotton producers who elected to accept options on Government-owned cotton as part of their compensation for cooperating in the 1933 emergency adjustment program have received more than \$70,000,000 in cash profits from the operation of the cotton producers' pool, organized to handle the options for the growers to whom they were issued.

In addition, as of December 15, 1934, more than 425,000 producers held participation trust certificates representing 1,700,000 bales of cotton that remained in the pool and on which further profits might be realized if cotton prices should advance.

Since its establishment the cotton producers' pool has liquidated, without disturbing normal market conditions, more than 800,000 bales of cotton that had previously been acquired by the Government through the operations of the Federal Farm Board and other loan agencies. Proceeds of this liquidation have been distributed among the cotton farmers who held options on the pooled cotton.

TITLE TO COTTON TRANSFERRED TO SECRETARY OF AGRICULTURE

Under authority of the Agricultural Adjustment Act, the Secretary of Agriculture obtained from the Farm Credit Administration the title to actual cotton and futures taken over by that organization from previously existing Government agencies. The President, under authority of section 220 of the National Industrial Recovery Act, allocated to the Farm Credit Administration \$60,000,000 of funds appropriated under that act, to reimburse the Farm Credit Administration for the difference between 5 cents a pound, the price paid by the Secretary of Agriculture, and the market value of the actual cotton and futures.

The Secretary of Agriculture borrowed from a group of New York banks \$58,486,654, or 6 cents per pound, on the 2,485,575 bales of cotton of an average weight of 500 pounds, of which he came into possession, in order to pay to the Farm Credit Administration the 5 cents per pound and an additional sum covering the differences in grade and staple above Middling $\frac{3}{8}$ inch, on a portion of the cotton.

Future contracts for 836,200 bales were included in the above figure of 2,485,575 bales.

NUMBER OF PRODUCERS SELECTING OPTIONS

Of 1,031,533 producers taking part in the 1933 adjustment program, 575,312, renting 6,218,607 acres of land, selected the cash and option plan of payment. They obtained options at 6 cents per pound on 2,447,474 bales of cotton. Rental payments to option holders averaged \$3.73 an acre less than rental payments to producers who elected the straight cash-rental plan, and this difference amounted to \$23,195,404.11 as a saving to the Government.

Option holders were given three alternative methods of handling their options. They might (1) order the sale of the cotton represented by the option and receive the proceeds of the sale, after the 6-cent option-purchase price had been deducted; (2) apply to have their option extended from May 1, 1934, to May 1, 1935, agreeing to pay the carrying charges on the cotton after May 1, 1934, and thereafter order the sale of the cotton and receive the proceeds as in (1); or (3) authorize the Secretary of Agriculture to establish a cotton pool under the control of a manager appointed by the Secretary, and turn over the options to the pool manager to be handled for the interest of the producers.

COTTON POOL ESTABLISHED

The Secretary of Agriculture established the cotton pool on January 8, 1934, and turned over to it 1,950,284 bales of cotton covered by the options that were surrendered to the pool. On this cotton the Secretary retained a lien of 6 cents a pound, the purchase price of the option.

The option holders, in surrendering their options to the pool, authorized the pool manager to borrow from the Commodity Credit Corporation an amount equal to 4 cents a pound on the cotton covered by their options, this amount to be advanced to the option holders as an initial distribution.

Between December 1, 1933, and December 15, 1934, a total of 129,670 growers holding options against 478,919 bales of cotton, ordered the sale of the cotton covered by their options, under the first and second methods described above.

In compliance with these orders the Secretary sold, during this period, 478,919 bales of cotton or cotton futures, at an average price of approximately 11.25 cents per pound. After deduction of the 6 cents per pound option-purchase price, the balance of \$12,132,178.52 was paid to the holders of the options.

During the same period 1,320 holders of options against 18,271 bales, had either extended their options to May 1, 1935, and had not ordered the cotton sold, or had permitted their options to lapse.

INITIAL DISTRIBUTION OF 4 CENTS PER POUND

Between the same dates 443,244 holders of options against 1,950,284 bales surrendered their options to the pool and received participation trust certificates issued by the pool.

Against the cotton in the pool the manager borrowed from the Commodity Credit Corporation 4 cents a pound, equivalent to \$20 a bale, an aggregate of \$38,991,041.76, and distributed this sum at the rate of 4 cents a pound among the certificate holders who had surrendered their options to the pool.

On July 31, 1934, the Secretary of Agriculture borrowed from commercial banks 10 cents per pound on the cotton in the pool. With this money, amounting to \$97,764,697, the Secretary paid off the loan of 6 cents per pound made by other commercial banks and also the Commodity Credit Corporation loan of 4 cents per pound.

PURCHASE OF CERTIFICATES

On August 24, 1934, with the approval of the Secretary of Agriculture, the manager of the pool announced to holders of participation trust certificates issued by the pool that they might, at their election, offer to sell their certificates to the pool manager at the market price prevailing upon any designated date subsequent to the date of the offer; and that the manager would, in his discretion, purchase the certificates so long as he was able to sell a quantity of cotton equal to that covered by the certificates purchased without seriously affecting general marketing conditions.

In purchasing certificates from the holders, the manager of the pool deducted from the purchase price the 10-cent-per-pound lien and carrying charges amounting to 30 cents per bale per month from February 1, 1934, to September 30, 1934.

At the close of business on December 15, 1934, the manager of the cotton pool had accepted offers of certificate holders to sell certificates on an aggregate of 187,857 bales, and on that date had sold on the market the same number of bales.

SECOND DISTRIBUTION OF 2 CENTS A POUND

The manager of the pool also announced on August 24, 1934, that arrangements had been made to borrow an additional 2 cents per pound against the cotton in the pool, for the purpose of making a second distribution among the holders of certificates.

Certificate holders applying for this second distribution, which amounted to \$10 per bale, authorized the manager of the pool to borrow from the Commodity Credit Corporation 2 cents per pound against their equity in the cotton. From the advance there were deducted carrying charges amounting to \$2.40 per bale, leaving a net balance of \$7.60 per bale to be paid to certificate holders, who also retained the privilege of selling their equity.

COTTON ACCOUNT OF THE SECRETARY OF AGRICULTURE

The cotton account of the Secretary of Agriculture, at the close of business on Saturday, December 15, 1934, stood as follows:

	<i>Bales</i>		<i>Bales</i>
Cotton acquired from Farm Credit Administration-----	2, 485, 571	Bales of cotton delivered by Secretary to pool---	1, 950, 354
Increase because of weight in replacing futures with spots-----	149	Sold against exercise options-----	478, 900
		Sold against surplus-----	7, 000
		Sold by W. M. Garrard and A. C. C. A. through December 15 ² -----	17, 408
		Actual cotton held by Secretary of Agriculture ³ -----	4, 858
		Cotton futures contracts held by Secretary of Agriculture ³ -----	27, 200
Total-----	2, 485, 720	Total-----	2, 485, 720

POOL COTTON ACCOUNT

The status of the pool at the close of business, Saturday, December 15, 1934, was as follows:

	<i>Bales</i>		<i>Bales</i>
Cotton received from Secretary of Agriculture--	1, 950, 354	Sold against certificates surrendered-----	187, 857
Long futures not allocated against certificates-----	19, 300	On hand actual cotton-- ⁴	1, 756, 397
		On hand futures----- ⁵	25, 400
Total-----	1, 969, 654	Total-----	1, 969, 654

The investment of the Federal Government in this phase of the cotton program was the \$60,000,000 allocated by the President. As an offset against this sum there should be an allowance to the amount of \$23,195,404.11, the saving to the Government in the lower acreage rental paid to farmers who elected to purchase pool options.

The cotton obtained by the Secretary of Agriculture as a result of these transactions has been made the basis of the following payments:

Cash paid to option holders who exercised, by sale, their options on 478,919 bales-----	\$12, 132, 178. 52
Cash paid (4-cent advance) to holders pooling 1,950,354 bales--	38, 996, 434. 69
Cash (to be paid) to certificate holders on the 2-cent advance, approximately-----	17, 000, 000. 00
Cash (to be paid) to certificate holders who elected to sell, approximately-----	2, 500, 000. 00

² W. M. Garrard is selling agent for the cotton pool located at Greenwood, Miss. A. C. C. A. is selling agent for cotton pool located at New Orleans, La.

³ 2,398 outstanding option contracts (this does not include options which may hereafter be approved and issued through claims) for 18,201 bales. An excess of 13,787 bales is held in reserve against future contingencies.

⁴ This figure includes 36,900 bales sold but not fixed against certificates on this date.

⁵ This figure includes 19,300 bales long futures.

Holders of certificates representing approximately 1,700,000 bales of cotton will receive such further payments as may result from any increases in price. On the other hand, the Government would be subjected to such loss as may result from a decline in the market below the price of 12 cents per pound plus carrying charges, if eventually the cotton should be sold on a lower market than 12 cents per pound and carrying charges.

V. THE COTTON PROCESSING TAX

The rate of tax upon the first domestic processing of cotton for the 1933-34 marketing year was fixed at 4.2 cents per pound, net weight of cotton, and became effective August 1, 1933.

At the beginning of the 1934-35 marketing year, it was found that the rate which had been in effect during the 1933-34 marketing year was within the provisions of the act and need not be changed. This rate is equivalent to \$20.08 per bale of 478 pounds net weight.

The processing tax, under the terms of the Agricultural Adjustment Act, applies only to the portion of the basic commodity concerned, which is domestically consumed, and the tax is abated or refunded on products of the commodity which are exported.

Under this provision, the tax on the first domestic processing of cotton applies to only about 40 percent of the cotton produced in the United States, that being the proportion of the total crop consumed in this country.

Since the cotton processing tax does not apply to cotton that is exported, the tax does not influence the world price of American cotton except to the extent, if any, that the processing tax reduces domestic consumption and thereby increases the quantity of cotton offered for sale in world markets.

EFFECT OF TAX ON CONSUMPTION

The question has been raised whether the processing tax operates to decrease domestic consumption of cotton.

Average annual domestic mill consumption of American cotton in the 5-year period 1925-29 amounted to 6,735,400 bales. In the 1932-33 season this figure was 6,137,395 bales. In the 1933-34 season, the first in which the processing tax was in effect, the consumption was 5,700,558 bales, a decline of 7.1 percent from the level of the preceding season and of 15.4 percent from the 5-year average.

From the fall of 1929 to the summer of 1932, mill consumption of cotton in the United States had declined drastically, partly as a result of the sharp decrease in the industrial use of cotton products during the depression. About 40 percent of the American cotton consumed in this country goes into industrial uses. Reduced consumer purchases of cotton clothing and household articles, and reduction in inventories of cotton products throughout manufacturing and distributing channels, contributed to the decrease in the mill consumption total during this period.

During the season 1932-33, mill consumption increased when a rising market and other developments stimulated sales of cotton textiles in manufacturing and distributing channels. Consumption by mills during that season was 26.1 percent greater than in the preceding year, and only 8.9 percent below that of the predepression period, 1925-29.

WOOL, RAYON, AND SILK DECREASE MORE THAN COTTON

The decrease in mill consumption of cotton from the level of 1932-33 to that of 1933-34, amounting to 7.1 percent, may be compared with decreases of 8.8 percent in consumption of wool, 9.1 percent in consumption of rayon, and 23.7 percent in consumption of raw silk.

During the 1933-34 cotton-marketing year, cotton consumption was 84.6 percent of average annual consumption during the 5 years 1925-26 to 1929-30, while according to the Federal Reserve Board's index of industrial production, general industrial production during 1933-34 averaged only 74.4 percent of the 1925-26 to 1929-30 base. (See fig. 16.)

Such information as is available indicates that stocks of cotton textiles in retail and probably in wholesale channels decreased during 1933-34. The Federal Reserve Board's index of department-store sales (by value) was higher for each month from August 1933 to October 1934 than during the corresponding month of the previous year. Department-store sales averaged 12.3 percent higher during

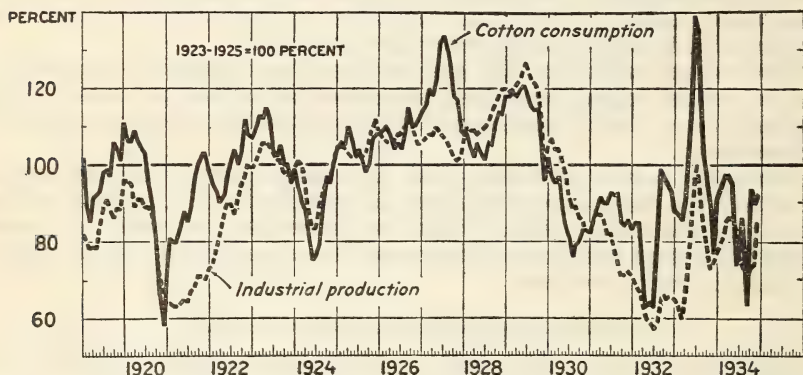


FIGURE 16.—Cotton consumption and industrial production in the United States, 1919-34.

1933-34 than during 1932-33, and a more marked increase occurred during the first 4 months of the 1934-35 cotton season.

Figures published by district Federal Reserve Boards show that sales in the cotton dress goods department of New England department stores were 21 percent higher during the first 10 months of 1934 than during the corresponding period of 1933, and that the increase in sales in the cotton dress goods departments was greater than in any other departments. Changes in the dollar volume of sales are, of course, influenced by changes in prices as well as by changes in the quantities of goods sold.

EFFECT ON PROCESSING AND DISTRIBUTION MARGINS

During the 5 years, 1925-26 to 1929-30, the price of 17 constructions (6 print cloths, 3 sheetings, 4 drills, 2 ducks, 1 twill, and 1 sateen) of unbleached cloth averaged 32.89 cents for a quantity of cloth obtainable from a pound of raw cotton. During the same period the cost of the raw cotton commonly used in the manufacture of these constructions of cloth averaged 18.40 cents per pound, or about 56 percent of the price of these cloths.

From August 1, 1933, when the processing tax went into effect, through October 1934, the prices of the same construction of cloths averaged 29.36 cents. The cost of the cotton plus the processing tax averaged 15.57 cents per pound, or 53 percent of the price of the cloth.

Thus, during the first 15 months that the processing tax was in effect, the cost of cotton used in the manufacture of unbleached cloth, with processing tax included, was 2.83 cents per pound less than during the 5-year period, 1925-26 to 1929-30, and constituted a smaller average percentage of the price of the cloth.

Since August 1, 1933, the cost of cotton to the mills has been much higher than during the 3 years immediately preceding that date. Those who protest against the processing tax usually refer to this period. From 1930-31 to 1932-33 the cost to the mills ranged from 12.81 to 5.21 cents per pound of cotton and averaged 7.99 cents. This is 43.1 percent of the price of grey cloth produced therefrom.

The margin between the price per pound of raw cotton (plus the processing tax since Aug. 1, 1933) and the price of 17 constructions of grey cloth for the 3 periods mentioned above averaged as follows:

	<i>Cents</i>
1925-26 to 1929-30.....	14. 49
1930-31 to 1932-33.....	10. 57
August 1933 to October 1934.....	13. 79

The trend of the margin was generally downward from 1925-26 to March 1933, reaching the low point of 7.34 cents during the week ending March 3, 1933. From that point the margin increased rapidly, and during the week which ended August 11, 1933, it reached 19.06 cents, the greatest recorded during the period August 1925 to November 1934. From this high point the trend was generally downward until July 1934, the margin falling to 11.40 cents during the week which ended July 13, 1934. From December 1933 to November 1934 the margin fluctuated between 11.40 cents and 14.29 cents.

From August 1933 to October 1934 the margin between the price of cotton and the price of cloth averaged 0.7 cent lower than from August 1925 to July 1930. The actual labor cost per pound processed averaged 0.23 cent lower. Apparently the margin available for profit, freight, overhead, and costs other than labor was 0.47 cent lower.

A comparison of the price of cloth, the cost of cotton, cost of labor, and the operating margin for three periods is given in table 15.

TABLE 15.—Average price of cloth and component costs for three periods

	Averages			Percentages of price of cloth		
	1925-26 to 1929-30	1930-31 to 1932-33	Aug. 1933 to Oct. 1934	1925-26 to 1929-30	1930-31 to 1932-33	Aug. 1933 to Oct. 1934
	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Percent</i>	<i>Percent</i>	<i>Percent</i>
Gray cloth price.....	32. 89	18. 55	29. 36	100. 0	100. 0	100. 0
Cost of cotton (including tax).....	18. 40	7. 99	15. 57	55. 9	43. 1	53. 0
Cost of labor.....	7. 43	5. 32	7. 20	22. 6	28. 7	24. 5
Operating margins for costs other than raw cotton and labor.....	7. 06	5. 24	6. 59	21. 5	28. 2	22. 5

ADDITIONS TO PRICE MADE BY PROCESSING TAXES

Available information indicates that, generally speaking, the cotton-processing tax, like the cost of cotton and other costs, has been passed on in prices of cotton mill products and has been borne by the consumer and not by the processor.

The increases in retail prices of overalls, sheets, shirts, and unbleached muslin since July 1933 are indicated by a study of prices for these products in 110 stores located in 25 cities. It is probable that retail price increases with respect to cotton articles were under way before the collection of these figures were undertaken.

These figures indicate that retail prices increased rapidly until about November 1933. The retail prices for overalls, sheets, shirts, and unbleached muslin, however, increased little from November 1933 through November 1934.

The increases in average prices of the four items are shown in table 16.

TABLE 16.—*Comparison of prices of various manufactured cotton items*

Item	July 27, 1933	November 6, 1933	Average, November 1933 to November 1934
Overalls (2.2 yards denim).....	\$1.09	\$1.53	\$1.56
Sheets (81 by 99 inches).....	.99	1.30	1.31
Work shirts (chambray).....	.73	.90	.91
Unbleached muslin (per yard).....	.10	.13	.14

For each of these products the difference between the price on July 27, 1933, and on November 6, 1933, is considerably greater than the amount that has been added to the cost of these articles by increases in cotton prices and by the cotton processing tax.

The additions that processing taxes make to the price of a cotton product vary in general with the amount of cotton used in the manufacture of that product. The processing tax on cotton used in the manufacture of certain products is shown in table 17, which also compares the amount of the tax with the average retail price for overalls, sheets, work shirts, and unbleached muslin. Average retail prices for the other articles are not available, but it is probable that comparatively few bear a higher percentage tax burden than those shown.

Assuming that all of the processing tax is passed on to consumers, but making no allowance for tax pyramiding, the burden of the cotton processing tax to consumers can be illustrated by showing the approximate amount of processing tax paid with respect to cotton articles commonly purchased. Such figures are shown in table 17.

With raw cotton prices at 12 cents per pound gross weight, the cost of the cotton used in the manufacture of the foregoing list of articles is about three times the amount of the processing tax. Thus, for overalls, the processing tax is 8.3 cents and the cost of the cotton used in their manufacture approximates 25 cents; in the case of work shirts the processing tax is about 3 cents and the cost of the cotton about 9 cents.

TABLE 17.—Amount of cotton processing tax compared to retail prices of cotton products

Article	Approximate amount of tax	Average retail price November 1933 to November 1934	Percentage tax paid is of retail price
Household articles:	<i>Cents</i>	<i>Dollars</i>	<i>Percent</i>
Sheet:			
63 x 99 inches (75 x 68) ¹	7.5		
81 x 90 inches (56 x 46) ²	5.0		
81 x 99 inches (75 x 68) ¹	9.6		
81 x 99 inches (74 x 62) ¹	7.7		
81 x 99 inches (64 x 64) ²	7.6	1.31	5.8
90 x 108 inches (87 x 80) ¹	10.0		
90 x 108 inches (75 x 68) ¹	11.6		
Pillow cases, pair:			
42 x 36 inches (60 x 48) ²	1.7		
45 x 36 inches (68 x 72) ²	2.4		
45 x 36 inches (80 x 80) ²	2.9		
Muslin, per yard:			
Brown, 36 inches (64 x 68) ²	1.3	.14	9.3
Bleached, 36 inches (73 x 60) ¹	1.4		
Bath towel, 24 x 48 inches.....	3.2		
Face towel, 18 x 36 inches.....	1.1		
Tablecloth, 54 x 60 inches.....	5.3		
Napkins, dozen.....	3.8		
Men's clothing:			
Overalls.....	8.3	1.56	5.3
Work pants.....	6.2		
Shirt, chambray.....	3.0	.91	3.3
Shirt, carded broadcloth.....	2.8		
Shirt, combed broadcloth.....	3.1		
Pajamas.....	4.1		
Woven athletic union suits.....	2.0		
Woven shorts.....	1.1		
Knit athletic undershirt.....	.8		
Socks:			
Carded yarn.....	.4		
Mercerized yarn.....	.5		
Women's clothing:			
House dress.....	3.4		
Uniform.....	3.8		
Slips, woven.....	1.4		
Bloomers, medium weight.....	1.4		
Vest, knit, medium weight.....	1.1		
Hose:			
Combed yarn.....	.6		
Mercerized yarn.....	.7		

¹ Warp and filling threads per inch, bleached.² Warp and filling threads per inch, unbleached.

It should be remembered that the processing tax was not an addition to the fair exchange value of cotton, but rather has reflected approximately the extent to which the cost of cotton was below its fair exchange value. During 1933-34 the fair exchange value of cotton as of the 15th of each month averaged 14.6 cents per pound. The unweighted farm price of cotton as of the same dates, plus the processing tax, averaged 14.5 cents per pound. The fair exchange value or parity price of cotton is that price which would give cotton producers the same purchasing power in terms of commodities farmers buy as it had during the 5 years 1909-10 to 1913-14.

REGULATIONS AND CERTIFICATES

As a result of hearings held and investigations made under the provisions of section 15 (a) of the Agricultural Adjustment Act, it was certified to the Secretary of the Treasury on June 12, 1934, that large cotton bags belong to a class of products of cotton that are of such low value compared with the quantity used in their manufacture

that the imposition of the cotton processing tax on cotton used in the manufacture of large cotton bags would prevent in large part the use of cotton in the manufacture of such products and thereby substantially reduce consumption and increase the surplus of cotton.

The Agricultural Adjustment Act provided that following such certification "the Secretary of the Treasury shall abate or refund any processing tax assessed or paid after the date of such certification with respect to such amount of the commodity [cotton] as is used in the manufacture of such products."

A further certificate with respect to large cotton bags was issued July 7, 1934. In accordance with the terms of this certificate and the amended provisions of the Agricultural Adjustment Act, upon the manufacture of large cotton bags from cotton fabric, the manufacturer of such bags is entitled at the time of such manufacture to a refund of the amount of any tax paid under the Agricultural Adjustment Act, as amended, with respect to the cotton fabric used in such manufacture.

COMMODITIES IN COMPETITION WITH COTTON

Public hearings have been held and investigations conducted with respect to jute, paper, rayon, silk, wool, flax, and miscellaneous fibers as commodities in competition with cotton under the terms of section 15 (d) of the act.

In view of developments relative to the abatement or refunding of taxes with respect to large cotton bags, and on the basis of public hearings held and investigations made, findings were proclaimed on June 12, 1934, relative to jute fabric and paper as commodities in competition with cotton. By virtue of these findings and the provisions of the act, processing taxes on jute fabric were restricted to the processing of jute fabric into small jute bags and the rate was altered from 2.9 cents per pound to 2.1 cents per pound of jute fabric.

Certain changes resulted also with respect to the tax on the processing of paper. Instead of the tax applying to the processing of paper into multiwall paper bags and coated paper bags, the tax became effective on the processing of paper into all kinds of paper bags printed, labeled, or otherwise identified as bags designed and in form for use in the packaging of grain flours, corn meal, sugar, salt, fertilizers, feeds, or potatoes, of a sacking capacity of 4½ pounds and over, and less than 75 pounds, the rate being altered and expressed in dollars per thousand bags produced rather than in cents per pound of paper put into process. The rate of tax was altered with respect to paper towels, and the definition of open-mesh paper bags was revised so as to correspond to the definitions of small cotton bags and small jute bags. In a proclamation dated May 31, 1934, the definition of gummed paper was revised, effective as of December 1, 1933. Investigations were continued with respect to other textile fibers as commodities in competition with cotton, but no findings were made during 1934 except with respect to jute fabric and paper.

CHAPTER 4

WHEAT

SALIENT FACTS ABOUT WHEAT ADJUSTMENT

1. Wheat acreage planted:		
Average acreage in 1930-32.....	acres..	66, 000, 000
Acreage in 1934.....	do.....	60, 000, 000
2. Average yield per acre:		
In 1924-33.....	bushels..	12. 5
In 1934.....	do.....	8. 2
3. United States production:		
In 1932.....	do.....	746, 000, 000
In 1933.....	do.....	529, 000, 000
In 1934.....	do.....	496, 000, 000
4. United States wheat carry-over:		
Approximate yearly average, 1920-30.....	do.....	120, 000, 000
July 1, 1932.....	do.....	385, 000, 000
July 1, 1933.....	do.....	393, 000, 000
July 1, 1934.....	do.....	290, 000, 000
Maximum indicated for 1935.....	do.....	145, 000, 000
5. Farm price below parity price:		
On Dec. 15, 1932.....	cents..	60
On Dec. 15, 1934.....	do.....	21
6. Number of wheat adjustment contracts signed.....		577, 254
7. United States wheat exports:		
Yearly average for 1930-31 to 1933-34.....	bushels..	89, 000, 000
1933-34 export quota under World Wheat Agreement.....	bushels..	47, 000, 000
1933-34 wheat exports under World Wheat Agreement.....	bushels..	26, 500, 000
8. Returns from wheat production:		
Cash income from wheat in 1932 crop year.....		\$195, 000, 000
Cash income from wheat plus benefit payments in 1933 crop year.....		\$366, 000, 000
Cash income from wheat plus benefit payments in 1934 crop year.....		\$380, 000, 000
Acreage needed with average yields to supply domestic and prospective foreign outlets.....	million acres..	56 to 58

A wheat farmers' adjustment program was undertaken in the United States in 1933 as part of the general agricultural adjustment. That program has been tested in practice in 1934, and the year has focused in sharper outline the need for some continuing adjustment, adapted to the changes which have occurred in the wheat situation.

No adjustment took place for the 1933 crop, but the seedings of winter wheat in the fall of 1933 affected directly the size of the 1934 crop. Likewise, at the end of 1934, the winter-wheat plantings for the crop of 1935 are completed. The 1935 crop is the last one to which the present 3-year wheat program applies.

The year 1934 witnessed the most widespread drought of record in this country and the shortest wheat crop in 40 years. Despite this calamity of nature, higher prices for the crops available for sale, plus adjustment payments to cooperating farmers, will give wheat farmers the highest cash income in the last 4 years. Preliminary estimates placed 1934 cash income from wheat, including adjustment payments, at \$380,000,000 as compared with \$365,000,000 in 1933 and \$195,000,000 in 1932.

The following pages record the progress of wheat adjustment, beginning in 1933 and including the year 1934; a description of the machinery set up for this adjustment; an appraisal of the results to date and the problems encountered; some of the effects of the 1934 drought; and some of the problems ahead for wheat farmers.

I. REVIEW OF WHEAT OPERATIONS IN 1933

Early in 1933 the cumulative effect of domestic and foreign policies regarding wheat had resulted in an emergency in this crop which called for immediate remedial action. At that time one-half of the surplus wheat of the world was concentrated in the United States, resulting in carry-over supplies more than twice normal. The carry-over of wheat in the four principal exporting countries had increased from 256 million bushels on July 1, 1923, to 745 million bushels on July 1, 1933. United States wheat producers faced increasingly high tariff barriers in foreign countries. These barriers increased prices in those countries, while greater production in exporting and importing areas was stimulated. World trade in wheat declined from more than 973 million bushels during the 1928-29 crop year to 629 million bushels during the 1932-33 crop year. These various factors combined to drive free world market prices to record low levels.

Among the principal factors which operated to continue the distress of the wheat farmer was the fact that wheat acreage in the United States was too large for available market outlets. Seedings for the 3-year period from 1930 to 1932 had averaged about 66 million acres. Domestic needs, however, could be supplied at normal yields from 50 million acres, and it did not seem likely that foreign outlets could be found for the product of more than 6 or 8 million acres at the most.

PLAN OFFERED TO FARMERS

Out of these demoralizing conditions and the demand for Government assistance which economic distress generated among the wheat farmers was developed the adjustment program for wheat. This program was offered to farmers only after representatives of the principal farm groups concerned had opportunity to study it and make suggestions on it. The main provisions of the wheat growers' adjustment plans were:

1. "Parity" return on that portion of the crop needed for domestic human consumption, that is, the return which will give the domestically consumed portion of the wheat crop the exchange value in terms of things farmers buy, that it had in the pre-war base period, 1909-14.

2. Each producer taking part in the wheat program signs a wheat-allotment contract in which he agrees to cooperate with other producers in adjusting production in accordance with market demands.

3. Protection of the consumer through the provision that each cooperating grower should plant at least 54 percent of his base acreage. With average yields,

this proportion of the acreage is sufficient to provide for domestic food requirements.

4. Financing of the program through a processing tax of 30 cents a bushel on wheat milled for domestic human consumption.

5. Voluntary acceptance of the plan by farmers.

6. Adjustment payments made to cooperating farmers independently of the market proceeds from the sale of their crop, thus providing partial crop-income insurance.

7. Decentralized administration through county wheat production-control associations.

The program, when offered to farmers, was widely accepted, and 577,254 contracts were signed covering approximately 51,400,000 acres of the land planted to wheat, and representing 78 percent of the total national acreage planted in the base period 1930-32. The 54 percent of the base production under the contracts, which is the allotment upon which adjustment payments are made, totals 350,345,000 bushels.

INTERNATIONAL AGREEMENT REACHED

Concurrently with the United States wheat-adjustment program, this country also signed an International Wheat Agreement in August 1933, under which the four principal exporting nations, Canada, Australia, the Argentine, and the United States, agreed to attempt to restrict their production for the 1934-35 crop year to 15 percent below normal production on the acreage planted in the years 1931-33. Agreement also was reached on export quotas for 2 marketing years, in which the United States agreed to a quota of 47 million bushels for the 1933-34 season and approximately 90 million bushels for the 1934-35 season.

Importing nations signing the agreement—including France, Italy, Germany, and the United Kingdom—agreed to seek to prevent increases in planted acreage and to encourage increased consumption, and agreed to begin reduction in their tariffs on wheat if the world prices should reach and be maintained at stipulated higher levels.

Although it was not found possible to fulfill completely all the conditions of the agreement—even in the United States we did not secure the full 15 percent acreage reduction expected—the international agreement was successful in that the reduction of wheat acreage here was not accompanied by expansion of acreage elsewhere. Partly as a result of this effort at international cooperation, the reduction of 8.3 percent in the United States acreage was accompanied by a reduction of 9.2 percent in the planted acreage of the other three principal exporting countries, from the averages for the years 1931-33, the base period of the International Agreement, and by general slight reductions of acreage in wheat importing European countries.

UNITED STATES PRICES ABOVE WORLD LEVELS

In the United States the launching of the wheat program and the national recovery program, the revaluation of the dollar, and the reduction of the 1933 crop by drought, resulted in a sharp advance in the price of wheat in the summer of 1933 (see fig. 17). Although prices subsequently declined, they remained at a level higher than those earlier in the year.

The normal relationship of Chicago and Liverpool prices, however, was not restored. Instead of United States prices being at the world level, far enough below Liverpool prices to permit free export movement, prices in this country remained above the Liverpool prices, as is shown in figure 18. This materially increased the income of the American farmer from the 1933 crop.

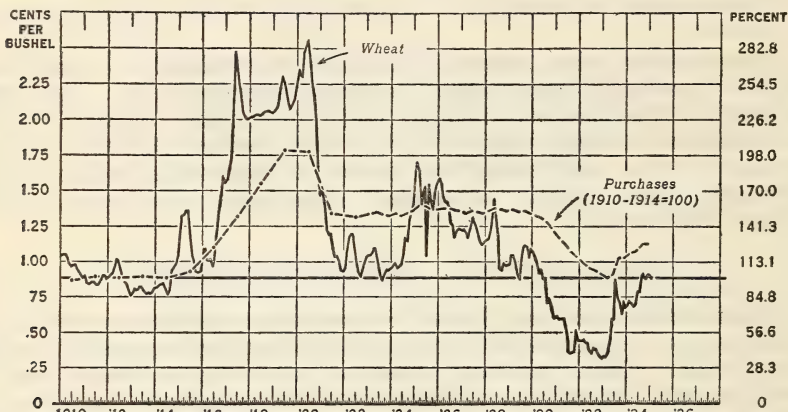


FIGURE 17.—United States farm price and fair-exchange value of wheat, July 1910 to December 1934.

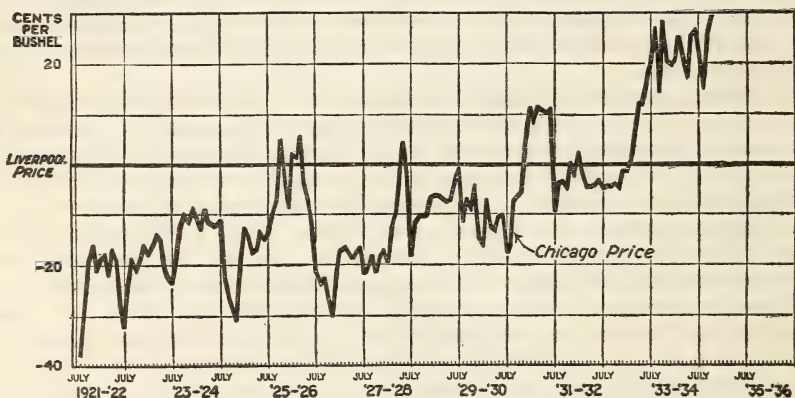


FIGURE 18.—Difference between Chicago and Liverpool wheat prices, July 1921 to December 1934.

NORTH PACIFIC EMERGENCY EXPORT ASSOCIATION

Good crops in 1933 and an accumulated surplus in the Pacific Northwest, northern Idaho, Washington, and Oregon prevented the price in this region from following to the full extent the advance in prices east of the Rockies. This condition was forcing a flow of this distressed wheat into Atlantic and Gulf markets, with a resultant depressing effect on prices there.

To meet the emergency created by this situation, the North Pacific Emergency Export Association was organized under the marketing-agreement powers of the Agricultural Adjustment Act. This association was empowered to reimburse exporters for the difference

between domestic prices and world prices on wheat and flour exported. Funds for this purpose were provided for from a reserve of 2 cents a bushel set aside from the processing tax. This association began operations on October 19, 1933, and prices in the Pacific Northwest region were prevented from becoming unduly depressed relative to prices in other parts of the country.

WINTER-WHEAT PLANTINGS ADJUSTED

By the end of 1933 definite improvement in the wheat situation was evident. The winter-wheat plantings for the 1934 crop indicated the first results of the acreage-adjustment campaign. With 41,850,000 acres of winter wheat sown, the average reduction for the country as a whole was 5.3 percent of the average seedings for 1930-32, despite increased plantings by noncooperating farmers.

Prices on the open market were substantially higher at the end of the year than they had been in the early months. (See table 18.) Each producer who had signed a contract received the approximate difference between farm prices and the parity price in the form of adjustment payments of 29 cents a bushel on his allotment. His allotment was the 54 percent of his base production that ordinarily is required for domestic human consumption. Distribution of the first payments of 20 cents a bushel on each farmer's allotment was started in November 1933. This was the first installment of the 1933 benefit payment. The second installment of 9 cents per bushel of allotment was subject to a pro rata reduction for local expenses.

These payments, although barely started in the last 2 months of 1933, had an immediate effect, improving business conditions in the wheat areas as this added income made possible the purchases of goods and payment of debts by farmers.

TABLE 18.—Average farm price of wheat, average parity price, average price of bread, collections of wheat processing tax, and wheat adjustment payments, by months, 1933 through 1934

	Farm price	Parity price	Bread price	Collection of wheat processing tax	Benefit payments
	<i>Cents per bushel</i>	<i>Cents per bushel</i>	<i>Cents per pound</i>	<i>Dollars</i>	<i>Dollars</i>
1933					
January.....	32.9	90.2	6.4		
February.....	32.3	89.3	6.4		
March.....	34.5	88.4	6.4		
April.....	44.8	89.3	6.4		
May.....	59.0	90.2	6.5		
June.....	58.7	91.1	6.6		
July.....	86.9	94.6	7.2	383,088.26	
August.....	74.7	99.0	7.6	10,646,087.96	
September.....	71.1	102.5	7.7	11,235,217.72	
October.....	63.6	102.5	8.0	10,231,235.95	
November.....	71.1	102.5	8.0	8,352,175.58	2,294,292.28
December.....	67.3	102.5	7.9	9,903,170.84	16,102,518.82
1934					
January.....	69.4	103.4	7.9	13,173,031.90	26,921,909.02
February.....	72.0	105.2	7.9	9,492,926.47	14,316,496.31
March.....	70.9	106.1	7.9	13,596,617.34	5,997,512.38
April.....	68.7	106.1	8.0	9,630,100.05	1,984,757.73
May.....	69.5	107.0	8.0	11,283,691.02	755,939.63
June.....	78.9	107.0	8.1	10,609,997.87	592,007.00
July.....	78.8	107.8	8.2	10,144,313.40	568,995.13
August.....	89.6	110.5	8.3	9,819,348.34	971,165.88
September.....	92.2	111.4	8.4	9,054,774.37	2,125,504.90
October.....	88.5	111.4	8.4	11,838,129.73	36,038,458.36
November.....	88.1	111.4	8.4	11,562,165.28	25,688,436.55
December.....	90.6	111.4	8.3	11,561,340.63	12,391,959.88

II. THE POSITION OF WHEAT IN 1934

In 1934 the statistical position of wheat improved, carry-over stocks were reduced and prices reached a point at which, with adjustment payments added, farmers under contract received parity on their domestic allotments. This improvement in price and reduction in carry-over stocks, however, was in part attained by the drought of 1934, which inflicted tremendous suffering on all farmers in the drought areas.

Plantings of wheat, reduced by cooperating farmers under the adjustment contract, and also reduced to a degree by unfavorable seeding conditions, showed a decided drop under the average of previous years, and the total seeded acreage for the 1934 crop amounted to 60,371,000 acres. Although with normal yields this acreage would have produced about 750,000,000 bushels the drought spread over practically the entire wheat belt, lowered the per-acre yield for the country to 8.2 bushels per seeded acre, as contrasted with an average yield of 12.5 bushels per seeded acre, to give a total wheat production for 1934 of 496,469,000 bushels, the smallest crop in 40 years.

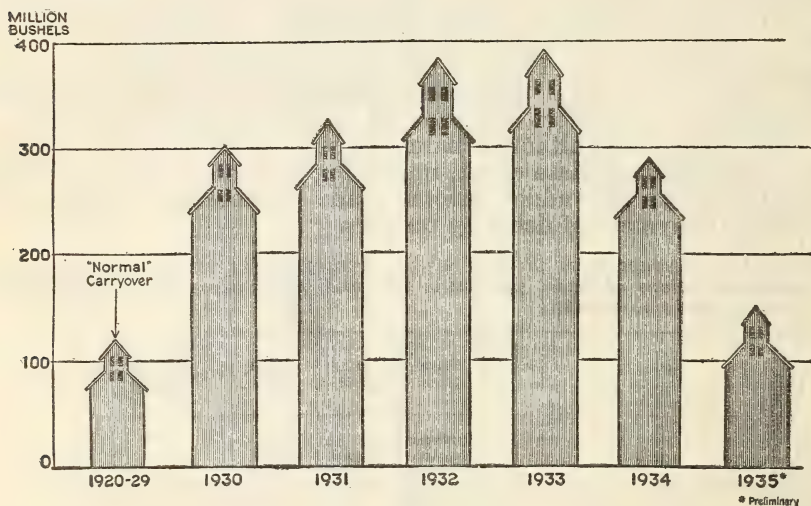


FIGURE 19.—Wheat carry-over in United States on July 1, 1920-35, preliminary estimate.

NORMAL CARRY-OVER IN SIGHT

This small crop, while not affecting the size of the carry-over as of July 1, 1934, indicates that the carry-over by July 1, 1935, may be about 150 million bushels. (See fig. 19.) This estimate is based on a crop of 496 million bushels and a carry-over of 290 million bushels, making total supplies for the year about 786 million bushels. Domestic requirements ordinarily average about 625 million bushels.

Thus the surplus in wheat has been worked off, in large part through two successive short crops caused by drought, but also in part through the acreage-adjustment program which sought this same result, but more gradually and with less suffering to farmers.

PACIFIC ASSOCIATION DOMINATED EXPORTS

The first 6 months of 1934 brought to a close the 1933-34 exporting season. The dominant factor in exports of United States wheat during this season was the operation of the North Pacific Emergency Export Association. The operations of this organization accounted for about 87 percent of the United States net wheat and flour exports for the 12-month period ending June 30, 1934. The association facilitated the export of more than 28,400,000 bushels of wheat. Of this amount 21,800,000 bushels were sold in the form of wheat and 6,600,000 bushels in the form of flour. The entire cost of the operation was about \$6,500,000 or about 23 cents a bushel for each bushel of wheat exported. The northwest exports were the deciding factor in narrowing the spread between Pacific and interior domestic prices.

Since July 1, when it became apparent that the 1934 crop would amount to less than the domestic requirements, and also because domestic prices have continued their abnormal position above Liverpool prices, exports have been relatively small. Total exports of wheat and flour from July 1 to the end of October 1934 were 10,125,000 bushels but these were offset by imports amounting to 8,274,000 bushels, net exports for the period being 1,851,000 bushels.

The association did not operate during the latter part of 1934 except to fill shipping orders on sales made before June 30. The surplus existing in the Pacific Northwest is available for feed in the drought-stricken areas or for food for relief distribution.

WHEAT GROWERS' INCOME IS HIGHER

Despite the severe setback occasioned by the drought, income of wheat farmers has been maintained at substantially higher levels than during the depression, as a result of higher prices brought about by improvement in the supply situation aided by adjustment payments to cooperating farmers. Table 19 shows the income of wheat farmers for the crop years 1931-34.

TABLE 19.—*Cash income of United States farmers from wheat sold during crop years 1931 to 1934; the added income from adjustment payments is shown for 1933 and 1934*

Year beginning July 1	Wheat sold or for sale	Cash income	Adjustment payments	Cash in- come plus adjustment payments
	<i>1,000 bushels</i>	<i>1,000 dollars</i>	<i>1,000 dollars</i>	<i>1,000 dollars</i>
1931.....	668, 754	254, 129		
1932.....	524, 047	194, 846		
1933.....	368, 192	267, 153	98, 600	365, 753
1934.....	¹ 320, 000	280, 000	² 101, 600	381, 600

¹ Preliminary estimate based on assumption that about 75,000,000 bushels will be used for seed, about 25,000,000 bushels for home flour consumption, and about 80,000,000 bushels for livestock feed.

² Preliminary, based on estimated farm allotments of 350,300,000 bushels and adjustment payment of 92 cents a bushel.

FEED WHEAT IMPORTED FROM CANADA

Two natural phenomena, drought in this country and early freezing in Canada, have brought about a new condition in this country—the importation of Canadian frost-damaged wheat for livestock feeding

purposes. Under the terms of the Tariff Act of 1930 wheat unfit for human consumption may be imported by paying an ad valorem duty of 10 percent, rather than the 42-cent tariff governing ordinary wheat imports. Up to December 1, 1934, only 1,334,000 bushels of such wheat had been imported, but the need for feed grains in the drought-stricken areas of the West made it appear that considerable quantities might be exported to the United States by Canadian farmers during the remainder of the winter for feeding in areas where freight charges were low enough to permit its use.

III. OPERATION OF THE WHEAT PROGRAM IN 1934

The contributions of the Agricultural Adjustment Administration through the wheat production control associations, to the welfare of wheat growers in 1934, may be summarized as follows:

- (1) Actual reduction in acreage under adjustment contracts.
- (2) Adaptation of the program to meet the exceptional conditions caused by the drought.
- (3) Increased income to farmers through adjustment payments and improved prices.
- (4) Crop-income insurance through adjustment payment.
- (5) Completion of the compliance program for wheat contracts, thus assuring every farmer that all other contracting farmers were fulfilling their contracts and also assuring consumers that in paying the processing tax they are helping themselves through increased purchasing power of wheat farmers who are really cooperating.
- (6) Completion of the organization of county wheat associations, and their continued operation.

Table 20 gives statistics on the accomplishments under this program.

TABLE 20.—*Wheat program: Number of farms and acreage under contract, farm allotments and adjustment payments by States 1933 and 1934*

	Farms growing wheat in 1929 ¹	Contracts approved ²	Seeded acreage 1930-32 ³	Percentage of average acreage under contract	Base acreage under contract ⁴	Average production 1928-32 ⁵	Farm allotment on contracts ²	Estimated 1933 adjustment payments ⁵	Estimated 1934 adjustment payments ⁵
	Number	Number	1,000 acres	Per cent	1,000 acres	1,000 bushels	1,000 bushels	1,000 dollars	1,000 dollars
NORTH ATLANTIC									
Maine.....	554		2			51			
New Hampshire.....	10								
Vermont.....	170		1			15			
Massachusetts.....	38								
Rhode Island.....	4								
Connecticut.....	51								
New York.....	24,931	589	220	6	12	4,411	150	44	46
New Jersey.....	4,836	192	50	7	4	1,157	43	11	12
Pennsylvania.....	84,496	3,417	955	9	90	17,387	902	254	262
NORTH CENTRAL EASTERN									
Ohio.....	97,387	23,811	1,745	35	613	30,480	6,048	1,718	1,754
Indiana.....	65,187	24,027	1,652	45	746	26,522	6,891	1,882	1,999
Illinois.....	66,836	23,937	1,971	51	999	32,533	9,302	2,492	2,698
Michigan.....	63,581	13,978	719	34	245	15,523	3,042	828	882
Wisconsin.....	24,072	1,197	101	13	13	1,869	141	39	41

¹ Bureau of the Census, 1930.

² From Records of Wheat Section as of Oct. 16, 1934.

³ From data of division of crop and livestock estimates.

⁴ Acreage included in contracts accepted, as of Oct. 16, 1934.

⁵ Based on payments of 29 cents a bushel on farm allotments, but for 1933, less contracts on which no payment was made in 1933.

TABLE 20.—Wheat program: Number of farms and acreage under contract, farm allotments and adjustment payments by States 1933 and 1934—Continued

	Farms growing wheat in 1929	Contracts approved	Seeded acreage 1930-32	Percentage of average acreage under contract	Base acreage under contract	Average production 1928-32	Farm allotment on contracts	Estimated 1933 adjustment payments	Estimated 1934 adjustment payments
NORTH CENTRAL WESTERN	<i>Number</i>	<i>Number</i>	<i>1,000 acres</i>	<i>Per cent</i>	<i>1,000 acres</i>	<i>1,000 bushels</i>	<i>1,000 bushels</i>	<i>1,000 dollars</i>	<i>1,000 dollars</i>
Minnesota.....	55,752	21,635	1,368	61	839	20,946	6,715	1,850	1,947
Iowa.....	18,998	3,699	369	39	143	7,445	1,739	1,431	504
Missouri.....	50,166	16,110	1,536	45	695	20,362	5,829	1,534	1,690
North Dakota.....	68,689	103,587	10,368	94	9,904	102,903	51,634	14,677	14,974
South Dakota.....	41,300	39,467	3,895	90	3,516	37,632	18,160	5,127	5,266
Nebraska.....	54,949	33,873	3,674	72	2,646	56,538	21,395	5,944	6,205
Kansas.....	88,320	93,900	13,516	89	12,088	177,431	85,376	24,398	24,759
SOUTH ATLANTIC									
Delaware.....	4,127	687	94	39	37	1,800	384	110	111
Maryland.....	19,378	7,739	439	66	289	8,648	2,866	796	831
Virginia.....	59,390	7,636	601	35	210	9,220	1,964	539	570
West Virginia.....	9,999	971	113	28	32	1,643	274	76	79
North Carolina.....	49,070	1,057	334	6	22	3,653	189	53	55
South Carolina.....	14,063		52			575			
Georgia.....	10,064	31	52	7	4	510	30	8	9
SOUTH CENTRAL									
Kentucky.....	12,553	3,964	259	54	139	3,002	933	249	271
Tennessee.....	21,804	2,268	249	28	71	2,918	473	128	137
Alabama.....			4			34			
Mississippi.....	12					3			
Arkansas.....	1,048	41	30	6	2	247	10	3	3
Louisiana.....	5								
Oklahoma.....	38,688	28,919	4,533	78	3,524	54,352	23,987	6,840	6,956
Texas.....	23,058	14,383	4,346	84	3,658	41,083	18,965	5,422	5,500
WESTERN									
Montana.....	29,143	38,898	4,446	94	4,336	45,168	22,747	6,331	6,597
Idaho.....	23,318	14,688	1,174	64	981	27,488	12,176	3,399	3,531
Wyoming.....	5,965	2,282	360	67	243	3,753	1,563	407	453
Colorado.....	18,856	11,794	1,755	83	1,452	17,111	7,680	2,142	2,227
New Mexico.....	6,922	1,682	480	81	388	4,148	1,793	497	520
Arizona.....	960	114	28	22	6	602	76	21	22
Utah.....	13,038	5,623	272	75	206	5,554	2,369	660	687
Nevada.....	858	302	15	57	8	378	112	30	32
Washington.....	14,690	11,472	2,471	79	1,943	42,882	20,219	5,802	5,864
Oregon.....	15,657	7,055	1,027	83	853	21,205	9,427	2,662	2,734
California.....	3,098	2,229	677	66	444	11,046	4,414	1,196	1,280
Not allocated.....							317		92
United States.....	1,208,091	577,254	65,958	78	51,401	860,228	350,345	98,600	101,600

ACREAGE REDUCED 8.5 PERCENT

As has been indicated, the total reduction in acreage was 8.5 percent from the base period 1930-32, of the wheat program. Although, theoretically, each grower under contract planted 85 percent of his base acreage, there are no data available to show how much reduction under 85 percent was made by contracting growers, and how much noncooperating growers increased their plantings. It seems probable, however, that more than a 15-percent reduction in acreage was made by cooperating growers.

The requirement that each cooperator plant the full 54 percent of his base acreage was waived in those areas where extreme drought

conditions made it obvious that such seedings would be useless. It was required that such exemption from plantings be requested of the county association by the farmer and the exemptions were made only in counties designated by the Administration. This exemption was applied in 486 counties in 16 States—California, Colorado, Idaho, Kansas, Minnesota, Montana, Nebraska, Nevada, New Mexico, North Dakota, Oklahoma, Oregon, South Dakota, Texas, Utah, and Wyoming.

PROGRAM ADAPTED TO DROUGHT

The drought gave opportunity for testing the flexibility of the wheat program. Under the adjustment contracts, farmers agreed that the 15 percent of their base acreage kept from wheat production would be used for limited purposes, such as summer-fallowing or for soil-building and erosion-preventing crops. It was originally intended that none of this land should be used for crops for pasture or to feed livestock which would subsequently be placed on the market. However, when the drought became acute, the restrictions upon the use of this land were modified, with the result that planting of pasture and emergency forage crops was authorized on this land in the drought areas.

Also of benefit to wheat growers was the reopening of the opportunity to sign contracts. The period in which new growers could sign contracts began in February and when the drought became severe, was extended until May 16, 1934, to give growers who had not previously signed, an opportunity to do so. Such new signers did not all receive the first installment on the 1933 adjustment payment, but were eligible for other privileges and payments under the program. As a result of this reopening, 10,022 new contracts were signed, representing an additional 774,297 base acres, and 8,135,618 bushels of production. Signers of these new contracts received the final 1933 and the 1934 adjustment payments, as a result of their joining other farmers in an effective national program.

FARMERS MEASURE FIELDS

An outstanding accomplishment was the undertaking and completion by farmers themselves of a compliance program, which included measuring all fields under contract and certifying to the Agricultural Adjustment Administration each contracting farmer who had complied with his contract.

This task of measuring 51 million acres of wheat land was done by the county production-control associations, using a generally uniform method developed by the wheat section, but adapted locally to meet the situation in the various States.

In each major wheat State the program was coordinated by a State compliance director. In each county association, field supervisors were nominated and final selections were made from these nominations. County agents held training schools for these local supervisors, who did the actual measuring. To check the accuracy of local measurements a follow-up survey of a small percentage of farms under contract was made by check-up men with engineering experience.

Completion of a compliance inspection and a report on each farm was a requirement for final 1933 and first 1934 adjustment payments.

Before adjustment payments were made there was prepared a complete record of the inspection of each farm along with supplementary maps and information indicating the use made of the land under contract.

The compliance program revealed that the overwhelming majority of farmers had complied with their contracts. Overplantings were found in certain instances, where the program got under way so late in the preceding fall that farmers did not have sufficient opportunity to acquaint themselves with the exact terms of the contract before they planted their wheat. In such circumstances the farmers willingly made the necessary adjustments.

Isolated cases of apparently willful violations of contracts have also been discovered and reported to the Administration by local control associations. When such violations are determined the contract signer is required to return all payments and expenses incident to his part of the program.

COUNTY ASSOCIATIONS FUNCTIONING

The organization of more than three-quarters of a million producers into 1,328 county wheat associations is considered one of the most important results, of the entire program. Called upon to furnish the decentralized machinery through which the program would be administered, the county associations have fulfilled expectations. Their membership includes wheat producers living in 1,758 counties in 37 States. More than 800,000 wheat producers, either landlords or tenants, are members of these associations. More than 10,000 producers serve as directors and officers. These local officers are elected by wheat producers themselves.

During the first year these associations performed several important tasks. They aided in determining individual base acreages and allotments, handled applications for new contracts, checked compliance with contracts, and served generally as connecting links between the individual producers and the wheat section of the Agricultural Adjustment Administration.

At the end of 1934 adjustment payments due to farmers up to that time under the wheat program were practically completed. These payments added approximately \$98,600,000 to wheat farmers' income from the 1933 crop, and when completed by the final payment on the 1934 crop will mean an addition of approximately \$101,600,000 to the return from that crop.

Betterment of the financial condition of farmers is not confined to these payments alone, but is also augmented by better prices received for the crops which they have to sell. (For State figures on adjustment payments see table 20.)

REVENUES AND EXPENDITURES

The wheat program, established on a self-supporting basis, has continued to pay its way. The processing tax of 30 cents a bushel on the milling of wheat for domestic human consumption has been in effect since July 9, 1933, and proceeds have averaged about \$10,000,000 a month. This has been sufficient to meet the expenses of the wheat program including those of the North Pacific Emergency Export Association.

Expenditures under the wheat program are:

- (1) Adjustment payments to farmers.
- (2) Refunds on exports and the costs of the North Pacific Emergency Export Association.
- (3) Reserve for refunds on floor stocks.
- (4) Refunds on relief flour.
- (5) Administrative expense.

Figure 20 presents, graphically, the distribution of money derived from the processing tax on wheat, as listed above.

About \$98,600,000 has been or will be paid to farmers as adjustment payments for 1933. Included in this amount is the local cost of

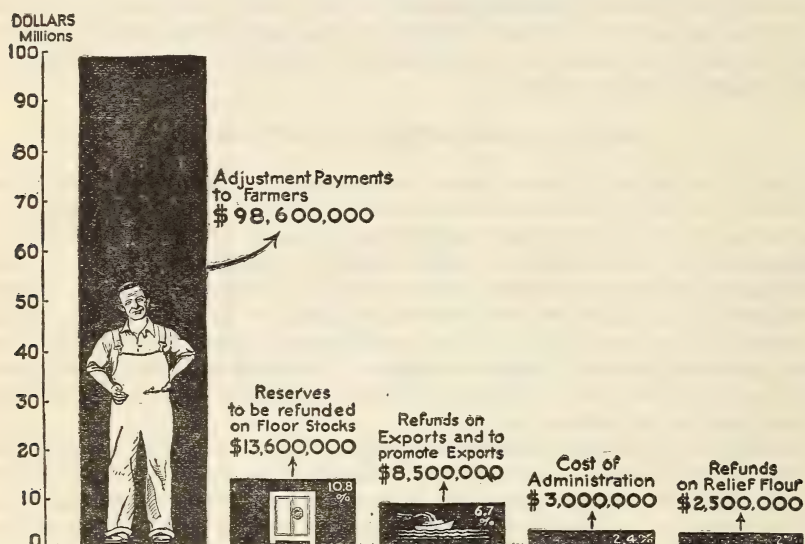


FIGURE 20.—Distribution of funds derived from processing tax on wheat, 1933-34.

administering the program in the field, which is paid by the farmers themselves.

The total cost of local administration by the county wheat associations, including the cost of organization, was approximately \$4,800,000 for the first year.

The total cost of promoting exports and refunds on exports amounted to about \$8,500,000 for the season 1933-34. The refunds on exports are provided for in the Agricultural Adjustment Act in order to enable domestic millers to compete in the world market. These refunds totaled approximately \$2,000,000 in the 1933-34 season. The remaining \$6,500,000 was the amount expended in facilitating the exports of about 28 million bushels of wheat from the Pacific Northwest, through the North Pacific Emergency Export Association.

The \$13,600,000 collected on floor-stocks tax is held in reserve to meet refunds on floor stocks which must be made at the time when the processing tax is removed as provided in the Agricultural Adjustment Act. Most of the floor stocks taxes were collected when the processing tax first became effective.

When millers ground wheat for charitable purposes they were allowed to claim a refund on the processing taxes. It is estimated that \$2,500,000 will meet these claims. Since June 26, 1934, millers have been allowed to claim these exemptions at the time of milling, instead of making claims for refunds.

Administrative expenses for 1933-34, other than costs of operating local associations, amount to about \$3,000,000. This included handling and auditing of contracts and compliance certificates, field expenses other than those of local associations, money paid to the Cooperative Extension Service for wheat-program activities, and handling of funds, issuing of checks and collecting the processing tax by the Treasury Department.

EFFECT OF TAXES ON BREAD PRICES

The processing tax of 30 cents a bushel, the rate at which the tax was set when the program began, has been continued for the 1934-35 season. The tax is established at the approximate difference between current average farm prices and the parity price. During the course of the wheat program this difference has varied as the market has gone up and down, and as levels of prices on manufactured goods have changed. At times the difference has been less than 30 cents a bushel and there has been pressure by millers upon the Administration to lower the tax. On the other hand, when prices broke sharply in the spring of 1934, there was a demand on the part of farmers that the tax be increased. The 30-cent rate, however, has closely approximated the average difference between the farm and parity price.

The processing tax is responsible for only about one-fourth of the average increase in the price of bread since April 1933, the month previous to the passage of the Agricultural Adjustment Act. Bread prices have increased 2 cents a pound, but only about half a cent of this can be attributed to the processing tax. The remaining cent-and-a-half increase is accounted for by increases in the price of wheat and in costs of labor and other materials. (For average United States bread prices, by months, see table 18.)

DROUGHT REDUCTION WAS INDISCRIMINATE

The drought of 1934, and the drought of 1933 before it, hastened the readjustment in wheat supplies which the wheat program sought to bring about gradually, yet the fact of drought has not affected the validity of acreage adjustment as a material factor in production control over a period of years.

Under the effects of drought the wheat surplus was reduced to manageable proportions within a period of 2 years. This result, with normal crops, would have taken several years longer, even with an adjustment program in effect. The price of such rapid adjustment has been high. Drought not only burned up crops for 2 years in succession to reduce the surplus, but it also reduced livestock feed supplies and other crops where no such reduction was necessary nor desirable.

When acreage yields are low because of drought, any advantage to be gained from planting more acres is slight. In fact, acreage reduction in such times may become a positive gain, since farmers save the cost of seed and labor on planted crops that would be abandoned.

On the other hand, in years of high yield, the importance of acreage reduction is proportionately greater. Then extra acres, if not held out of production, add a proportionately larger amount of wheat to the crop. In such years this extra production has a disproportionate effect in lowering the prices farmers receive for their entire crop.

The crop of 1934, the lowest on record, was harvested during the first year in which the acreage-reduction factor of the wheat program was effective. Despite this tremendous drop in production, however, surplus supplies of wheat make it certain that there is no danger of any food shortage in this country. The 1934 wheat program authorized the planting of 85 percent of the base acreage of contracting farmers. For 1935 the Administration has authorized farmers to increase their plantings to 90 percent of their base acreage. Benefit adjustment payments for the year are to be the same, 29 cents per bushel of allotment.

INTERNATIONAL COOPERATION IN 1934

The acreage reduction agreed upon under the International Wheat Agreement in 1933 was only for the 1-crop year, 1934-35. However, the organization set up under the agreement has continued to meet regularly and efforts are being made to extend the agreement.

International agreement upon limitation of exports was also reached in 1933. This part of the agreement established export quotas for the principal exporting countries for the 1933-34 season and for the 1934-35 season. The export quotas for the 1933-34 season were agreed to in August 1933 when the crop already was growing or being harvested, and when it was too late for any country to reduce that year's production. All the nations except Argentina were able to keep within the quotas established for them, but in that country a crop much larger than had been expected when the quotas were fixed and the fact that storage facilities are inadequate resulted in shipments exceeding the quota. Although the present second-year quotas are still nominally in effect, the failure to secure agreement on provisions to make systems of quotas more flexible to care for such emergencies as that of Argentina during the last season, have made the quotas for the current year less significant. The following table shows the quotas established for 1933-34 and the actual shipments made.

Country	Quota 1933-34	Actual shipments 1933-34
	<i>Million bushels</i>	<i>Million bushels</i>
United States.....	47	26.5
Canada.....	200	194.3
Australia.....	105	85.1
Argentina.....	110	146.9

Although complete attainment of the goals set in the initial agreement was not reached in the first year of its operation, substantial achievement was accomplished. To the American wheat growers the most significant fact was that foreign competitors were not increasing production while decreases were being made in the United States, but rather that the move to adjust world production was an international cooperative effort.

The form in which the international cooperation in wheat production adjustment will be kept in operation after the 1934-35 marketing season has not yet been determined, but it seems certain that some method of continued international action will be worked out.

NATIONAL WHEAT ADVISORY COMMITTEE

The national wheat advisory committee, comprised of four members, representing the eastern, Pacific northwestern, the Winter Wheat and the Spring Wheat Belts, was formed in the first year of the wheat program. This committee provided additional representation for producers in giving to the officials of the wheat section the benefit of their experience and viewpoint in the development of the program.

CODES

The chief agencies handling the farmer's grain established codes of fair competition during the year.

The first important code to be put into effect was that for the grain exchanges, which was approved by the President March 20, 1934. Principal provisions of this code were: The establishment of minimum margin requirements on futures trading, with exceptions for spreading and hedging trade; establishment of maximum daily fluctuations in the price of futures; and the establishment of a code authority, at the meetings of which the Secretary of Agriculture and the Administrator of the National Recovery Administration were entitled to be represented.

On May 8, the President approved a code of fair competition for the country grain-elevator industry. This code brought this widely decentralized industry into one organization for the first time. Its chief provisions were to prohibit unfair-trade practices disadvantageous to the farmer, such as unfair grading and weighing.

In an order effective December 24, 1934, the terminal grain-elevator industry was made a subdivision of the grain exchanges and was placed under the code of fair competition for that group. As practically all members of the terminal-elevator industry are also members of the grain exchanges, the grain-exchange code became applicable with slight modifications.

A code of fair competition for the wheat flour-milling industry became effective June 13. This code prohibited unfair methods of competition, set forth provisions governing flour-sales contracts, and named a temporary code authority, which was later replaced by a code authority elected by members of the industry.

IV. PROBLEMS AHEAD

The wheat program is now entering the final year of the 3-year period covered by the contracts. It will be in effect until the end of the 1935-36 marketing year, but if further adjustment is to be made for wheat, it will be necessary to have a program developed early in the spring of 1935 so that farmers may have the necessary information before preparing land for winter-wheat plantings for the 1936 crop.

Before that time arrives, the Administration will consult with interested farm organizations and with the county wheat associations regarding the further steps that should be taken for wheat. In

formulating a program to be offered to farmers, the opinions of producers themselves will be given primary consideration.

Six facts stand out in the wheat situation at the end of 1934. These are:

1. The export market for United States wheat remains uncertain. Irrespective of its causes, this stubborn fact remains. Chief among the causes are the tariff and other trade barriers which have been erected against wheat by nations seeking self-sufficiency. Also, the inability of foreign nations to buy from us when we do not buy from them limits our wheat exports.

2. There is little opportunity to increase consumption of wheat for food in the United States enough to help the situation materially.

3. Conditions during the last 18 months have resulted in United States prices being above world levels. Two years of drought, our tariff, monetary policy, and the acreage-adjustment program have contributed to maintain this favorable-price relationship. With normal world and United States crops a return of domestic-price levels more nearly in line with those prevailing on world markets is to be expected.

4. The surplus has been reduced by drought and acreage adjustment. By next July it probably will be at or about a normal figure.

5. The Nation's wheat-producing capacity is as great as ever. The same acreage which in recent years produced more wheat than our markets could absorb at a reasonable price is still available for planting. Although about 66,000,000 acres were seeded to wheat in the years that produced our surplus, our present market outlets do not appear to require an average of more than about 58,000,000 planted acres.

6. The mechanism of the processing tax now in operation is aiding farmers to achieve a fair income on the domestically consumed portion of their crop.

WHEAT PRODUCERS FACE THREE COURSES

In general, American wheat producers face the choice of three courses which agriculture in general faces. The first is complete lifting of restrictions and unlimited production. The second is production for domestic consumption only. The third is a program of reasonable control, flexible enough to meet any expansion which may occur in our export market.

American farmers have had one experience with a practically unsalable surplus. In looking ahead they have to consider the possibility of another surplus if they abandon their present effort to adjust their production. Unlimited production means either exporting wheat or allowing surpluses to mount and selling wheat at feed prices. Exporting wheat means selling at world prices.

Reducing production to a domestic basis might mean a considerable dislocation of our farming system. It would create at once the problem of finding alternative crops or alternative occupations for farmers whose production of wheat would no longer be necessary.

Finally, there is the alternative of farmers themselves continuing reasonable control of production and allowing for such export trade as may be developed without unreasonable price sacrifices.

CHAPTER 5

CORN AND HOGS

SALIENT FACTS ABOUT CORN-HOG ADJUSTMENT

1. Number of farming units under 1934 corn-hog contract.....	1, 155, 300
2. Average (1932-33) corn acreage represented by 1934 contract.....acres.....	55, 313, 500
3. Approximate percentage of United States average (1932-33) acreage represented by contract.....	55
4. Total number of acres contracted to Secretary under 20 minimum-30 maximum percent adjustment range.....	13, 030, 000
5. Average number of head of market-hog production (from 1932-33 litters) represented by contract.....	54, 320, 000
6. Percentage of United States average hog production represented by contract.....	75-80
7. Gross corn adjustment payment at 30 cents per bushel of yield estimated for contracted acres.....	\$111, 840, 000
8. Gross hog adjustment payment at \$5 per head on 75 percent of market-hog production average.....	\$203, 700, 000
9. 1934 corn-hog referendum:	
Number of farmers voting.....	579, 716
Percent of all signers voting in referendum.....	46
Number of signers favoring countinuanee of corn-hog adjustment.....	374, 584
Number of signers not favoring continuance of corn-hog adjustment.....	161, 106
Percent of those voting who favored continuance.....	69. 9
10. Percent adjustment from average 1932-33 hog production required in 1935 contract.....	10
11. Percent adjustment from average 1932-33 corn acreage required in 1935 contract.....	10-30
12. Payment per head under 1935 contract for 10 percent of average market-hog production in base period.....	\$15
13. Payment per bushel of yield estimated for acreage withheld from corn production.....cents.....	35
14. Amount loaned on farm-stored corn under 1933-34 corn-loan program at 45 cents per bushel.....	\$121, 000, 000
15. Bushels of corn stored under 1933-34 corn-loan program.....	271, 000, 000
16. Value per bushel in 1934-35 corn-loan program.....cents.....	55

The year 1934 marked the real beginning of effective production control through group action in the corn-hog industry in the United States. It saw the end of emergency adjustment through purchase and removal of hogs and hog products from regular trade channels. Corn and hog prices improved substantially. Over 1,000,000 producers, living in all parts of the country, organized themselves into county production-control associations. The adjustment program proved its quick adaptability to helping farmers cope with drought conditions. During the early fall, corn-hog farmers voted directly

on whether they desired another corn-hog program in 1935. In response to the favorable vote, a new program for corn and hogs was developed and put into action.

At the beginning of 1934 corn-hog farmers, acting through the Agricultural Adjustment Administration, were making a 2-handed attack on their fundamental problem of excess production and low prices. On the one hand, purchases of market hogs and hog products, in order to reduce to more reasonable proportions the volume moving into regular trade channels, were being continued. On the other hand, the sign-up of the 1934 corn-hog adjustment contracts, the first move really to control producing units at the farm, was being launched. Along with these measures, the Government's 1933 corn-loan program was helping the farmers.

I. THE SUPPLEMENTAL-PURCHASE PROGRAM

Early in the fall of 1933 the Agricultural Adjustment Administration, under pressure of a prospective collapse of the hog market, and at the instance of corn-hog producer representatives, who were aware of the situation that was developing, had bought at market premiums and processed about 6,200,000 pigs and about 220,000 sows. In view of the extensive unemployment and large relief rolls it was recommended that the products of this emergency slaughter be turned over to the Federal Emergency Relief Administration and financed in part by processing-tax proceeds that otherwise would go to the producers. The heavy pigs and the sows were converted into dry salt pork and nearly 100,000,000 pounds were distributed through the Federal Emergency Relief Administration to needy families. Light pigs unsuitable for economical processing into meat, because of their size and condition, were converted into grease and fertilizer tankage. This emergency action was taken because the number of hogs farrowed in the spring of 1933 had been 4 percent larger than the number farrowed in the spring of 1932; moreover, the Government pig survey on June 1, 1933, had indicated that an unusually large number of sows would farrow in the fall.

But because the effect of the emergency pig- and sow-buying program had not yet had time to develop, marketing of hogs at the principal processing points during the closing months of 1933 and the first several weeks of 1934 was unusually heavy. In consequence, hog prices declined to lower levels.

In view of this situation the Administration, near the close of 1933, arranged with the Federal Surplus Relief Corporation for additional purchases of live hogs and hog products for relief purposes. This was proposed in order to adjust further and more immediately the volume of hog products entering regular trade channels, and thereby to raise the market price, or at least to prevent further declines.

INAUGURATED AS AN EMERGENCY MEASURE

The buying of additional live animals was inaugurated as an emergency measure in November 1933 and was continued at intervals thereafter for several months. The most extensive supplemental purchases of live hogs were made during January 1934, when approximately 442,000 head were bought and processed for Government account. During succeeding months the rate of purchase was considerably reduced. The buying of live hogs was discontinued in May.

The first purchase of hog products was arranged in December 1933. Further purchases were made at intervals during the remainder of the winter. The supplemental buying of hog products for relief distribution also ended in May.

Altogether, the supplemental purchases of hogs, including the number bought during the closing months of 1933, amounted to approximately 1,400,000 head. The purchases of products, that is, cured pork and lard from processors' stocks, amounted to about 92,000,000 pounds, or the equivalent of about 600,000 market hogs.

The grand total live hog equivalent of all the Government purchases, including the market hogs represented by the pig- and sow-buying program, amounted to about 10 percent of the total average annual hog slaughter of recent years.

The total cost of the supplemental purchase program amounted to about \$13,500,000, of which approximately \$9,240,000 went directly to farmers in payment for live animals. The share of the total cost borne by the Agricultural Adjustment Administration amounted to about \$11,000,000. This amount was paid out of hog-processing-tax proceeds. The remainder of the total cost was met by the Federal Surplus Relief Corporation. The cost of preparing the finished hog products for shipment and the expenses of distribution, such as railway freight, were borne by the Federal Emergency Relief Administration.

PRICES RISE IN RESPONSE TO BUYING PROGRAM

The supplemental purchase program, as already indicated, produced a more immediate effect on hog marketings and prices than did the emergency pig and sow buying program. Both programs, however, were effective over the first half of 1934. The emergency pig and sow buying program was most effective during February and March. Marketings dropped materially as expected. Prices rose sharply and remained relatively high until some time in the late spring months, when marketings picked up again with the arrival of the bulk of the 1933 fall pig crop. The effects of both programs were temporarily obscured during May and early June when marketings increased sharply on account of drought liquidations in the western Corn Belt. Prices recovered rapidly after the middle of June, however, as soon as marketings subsided.

Aside from influencing hog prices, the buying programs also served as timely drought relief for farmers in the Dakotas and adjoining territory, who were short on feed because of unfavorable weather conditions in certain areas in 1933. The programs, by reducing hog numbers, conserved, for the country as a whole, 60 to 70 million bushels of corn that otherwise would have been fed. Eventually, this corn helped greatly in relieving the general drought situation in the summer and fall of 1934. A large volume of hog products was made available for distribution to needy families.

The slaughtering of growing pigs and bred sows, and the supplemental purchase of market hogs and hog products, are generally recognized as makeshift devices, to adjust production, and they are suitable only in such an emergency as that of 1933 and early 1934. Forehanded control of corn acreage and the number of sows bred to farrow is in general the easier, more logical, and more economical course. That course was not undertaken in 1933 because of the lack of time after the Agricultural Adjustment Act was passed. It was undertaken, however, as soon as possible in 1934.

II. THE 1934 CORN-LOAN PROGRAM

When the Adjustment Act was passed in the spring of 1933, the season was so far advanced that immediate undertaking of corn-production control was not possible. The 1933 crop was already being planted.

By the fall of 1933, although drought in the northwestern Corn Belt had caused some reduction in the total crop, there was need for actively stimulating the purchasing power of corn. This stimulation could not be applied at that time through adjustment of production. The plan for controlling corn acreage in 1934 had not yet been fully developed, and corn benefit payments would not be forthcoming until well along in 1934. In the meantime many farmers would be obliged by their financial circumstances to sell their crop. Any subsequent rise in the value of corn would then benefit speculators and others who had bought it, rather than the producers themselves. Development of any effective marketing agreement to raise corn prices for producers did not seem possible.

COMMODITY CREDIT CORPORATION PLACED IN CHARGE

As a practical alternative, a plan for making loans on corn, properly warehoused and sealed, was announced by the Secretary of Agriculture late in October 1933, after a conference with the President. The Commodity Credit Corporation was put in charge of the corn-loan program.

A commitment of \$150,000,000 for corn loans was obtained from the Reconstruction Finance Corporation. All banks, cooperative marketing associations, or other corporations, partnerships, associations, or persons (except lending agencies of the Reconstruction Finance Corporation) were authorized to lend money to producers on eligible farm warehouse certificates in States having farm warehouse laws, or on elevator receipts in States not having farm warehouse laws.

The gross value of the loan was established at 45 cents per bushel and the interest rate was set at 4 percent. At the time the program was begun this loan value was considerably above the average farm price of corn.

In effect, therefore, the program was a modified price-fixing plan. But in signing the loan agreement the borrower agreed to participate in the 1934 corn-hog production-control program, the outline of which had just been announced. The loan program thus gave farmers, in advance, some benefit from the increase in the value of corn that was expected to occur as a result of the somewhat reduced corn crop in 1933, and the prospect of a substantial acreage reduction in 1934. Because it was definitely linked with production-control measures, the liberal loan program was economically sound.

NO RISK FOR BORROWERS

The loan agreement involved no recourse on the farmer borrower, provided the agreement (including compliance with the 1934 corn-hog contract) was fulfilled, and provided the borrower made no misrepresentation of fact in procuring the loan. The borrower was given the option of retiring the loan by paying cash, plus accrued interest, at any time on or before the maturity date, August 1, 1934, or if the

market price of corn on the maturity date was less per bushel than the amount loaned per bushel, the borrower might dismiss his obligation by turning over to the Commodity Credit Corporation or its representatives the number of bushels of corn originally stored.

On the other hand, the loan agreement also provided that in the event the price of No. 2 corn at Chicago reached 75 cents or more, the Commodity Credit Corporation might call the loans.

In surplus-producing States with farm warehouse acts, farmers were permitted to borrow on corn which they had purchased for feeding livestock, provided they had paid not less than 45 cents per bushel for this corn and had obtained from the original producer an agreement to participate in the 1934 corn-hog production-control program. Tenants were permitted to borrow if the landlord agreed to comply with the corn-hog contract. Landlords were permitted to borrow on their share of the corn crop provided they signed an agreement that the corn and hog production on the farm on which the corn was grown would be reduced in 1934.

First loans on farm-warehoused corn were made in Iowa during the latter part of November 1933. As soon as county warehouse boards could be organized, similar loan activities also were begun in the other eligible States. In some States loans were delayed until the respective legislatures could pass farm warehouse acts. The bulk of the loans, therefore, was made during the early months of 1934.

LOAN PRIVILEGE EXTENSIVELY UTILIZED

The loan program was utilized extensively by farmers over the Corn Belt. The program was limited to the Middle Western area because it is the area of surplus production where most of the commercial supplies of corn are produced. The original date selected for closing applications, February 28, 1934, was extended to April 30 upon the demand of farmers. The total amount of money loaned and the volume of corn stored under the program by States are as shown in table 21.

TABLE 21.—*Amount of loans and volume of corn stored, under commodity-loan program, by States*

	Aggregate of loans	Aggregate volume of corn stored
		<i>Bushels</i>
Colorado.....	\$70, 000	150, 000
Illinois.....	31, 100, 000	69, 660, 000
Indiana.....	1, 200, 000	2, 680, 000
Iowa.....	57, 150, 000	128, 010, 000
Kansas.....	1, 000, 000	2, 240, 000
Minnesota.....	5, 500, 000	12, 320, 000
Missouri.....	1, 000, 000	2, 240, 000
Nebraska.....	22, 000, 000	49, 280, 000
Ohio.....	280, 000	620, 000
South Dakota.....	1, 700, 000	3, 800, 000
Total.....	121, 000, 000	271, 000, 000

The corn-loan program eventually proved a much greater boon to the approximately 145,000 participating producers who took advantage of it and placed corn under seal than was at first anticipated. On account of the severe drought in 1934, the corn-hog adjustment program, and other factors, the value of corn by midsummer of 1934

had risen far above the original loan value of 45 cents, plus interest, sealing charges, and other accrued costs, the grand total of which averaged about 47.5 cents per bushel.

BORROWERS MAKE NET GAIN ON LOANS

Many producers sold their corn at a price high enough to have a considerable margin of profit after the loan obligation had been retired. Careful study of the available figures shows that the borrowers who sold their corn made an average net gain of more than 30 cents per bushel.

The 1933 corn-loan program encouraged more economical feeding during the winter of 1933-34 and a smaller delivery of corn to commercial trade channels than otherwise would have been the case. It probably resulted in carrying as much as 50,000,000 more bushels of corn into the latter part of the 1934 feeding season than otherwise would have been carried. As it turned out, this was of great assistance in helping farmers to meet 1934 drought conditions.

Farmers who had need of the corn under seal were permitted to release some of the stored corn, provided there was a proportionate payment on the outstanding obligation.

In midsummer the Commodity Credit Corporation, with the approval of the Secretary of Agriculture, modified the provisions of the loan agreement to extend the maturity date from August 1 to September 1, 1934. This was done in order to give borrowers who had not yet retired their notes an opportunity to make satisfactory arrangements for repayments. During the month of August partial and complete liquidation of loans continued at a heavy rate. By the end of the month the volume of corn under seal had been considerably reduced.

MATURITY DATE AGAIN EXTENDED

About September 1, the loan provisions were again modified to extend the final maturity date on 1933 loan agreements until January 1, 1935. This was done to assure continued orderly liquidation. Before this modification went into effect, however, a new loan program, under which new loan agreements might be substituted for the old agreements, was developed and announced. Old borrowers were given the option of either settling their outstanding notes by October 15, 1934, or substituting a new note. The borrower also was required to have a new inspection of the sealed corn and a new warehouse certificate.

The value for these new loans was established at 55 cents per bushel. Thus old borrowers substituting new notes for the old notes received an increase of approximately 10 cents per bushel. In view of the probability that old corn would be needed for seed purposes in many localities, it was required that unsuitable cribs housing corn under seal must be repaired before the new loan was granted. In some cases it was required that the corn be moved to a crib of more permanent construction.

The aggregate value of old loans converted into new loans amounted to about \$8,000,000.

The maturity date of the 1934 loan agreement was given as June 30, 1935, and the price at which the loans might be called by the Com-

modity Credit Corporation was given as 85 cents per bushel. As under the 1934 program, a call price is provided in order that the Commodity Credit Corporation may insure getting feed for drought sections in case feed prices rise.

Under the 1934 loan program, borrowers were required to take out both primary and secondary insurance, that is, fire, windstorm, and tornado protection, as well as theft and conversion protection. Through an arrangement with underwriting companies the rate on primary insurance was reduced from \$1.55 to 75 cents per \$100 of value. The premium on secondary coverage was reduced from 4.5 cents to 2 cents per \$100 of value.

III. THE 1934 CORN-HOG ADJUSTMENT PROGRAM

Although the emergency hog buying and the corn-loan plans materially affected prices, their influence was more or less temporary and supplementary. The first really fundamental plan for raising corn and hog prices under the Agricultural Adjustment Act was the 1934 corn-hog contract, announced in the fall of 1933 and put into effect shortly after the opening of 1934. This program provided for control of the number of producing units, that is, the acreage in corn and the number of sows farrowing, whereas the buying program only made emergency adjustments in the surplus already in existence.

The 1934 corn-hog reduction contract had been developed after a good deal of discussion with producer representatives from the principal corn-hog States. It called for reductions below the 2-year (1932-33) average of not less than 20 percent in corn acreage and of 25 percent in the number of hogs produced for market. Reductions in both corn and hogs were included under a single contract, because of the close relationship between the two commodities, and because serious administrative difficulties would have arisen in handling separate contracts for corn and hogs.

For keeping corn acreage and hog production within the limits of the 1934 contract, the cooperating producer was offered two benefit payments—one for corn at the rate of 30 cents per bushel on the estimated yield for the contracted acres; and one for hogs at the rate of \$5 per head on 75 percent of the adjusted annual average number of hogs produced for market from litters farrowed during the 2 years from December 1, 1931, to December 1, 1933, and owned by the producer when farrowed. The contracting producer was given the option of contracting to the Secretary as much as 30 percent instead of the minimum 20 percent of the base corn acreage on his farming unit, in which case he would receive corn benefit payments in proportion.

RESTRICTIONS RELAXED WHEN DROUGHT DEVELOPED

It was required that acres taken out of corn production under the provisions of the 1934 program be set aside as contracted acres and used only as prescribed by the Secretary. Originally, the Secretary permitted this acreage to be used only for planting permanent pasture, for soil-improving and erosion-preventing crops not to be harvested, for resting or fallowing the land, for weed eradication, or for planting farm woodlots. As will be noted later, however, restrictions concerning the use of contracted acres were relaxed when drought conditions developed.

In order to prevent uneconomic shifting from corn and hog production to other crops, it was originally specified that the contracting producer should not make certain increases in acreage and livestock in 1934 above what he had had in 1932 or 1933, whichever was higher.

He could not increase: (a) the total acreage of crops planted for harvest plus the contracted acres; (b) the acreage planted for sale of any crop designated as a basic commodity in the Agricultural Adjustment Act; (c) the total acreage of feed crops other than corn and hay; (d) the number of any kind of livestock, other than hogs, designated as a basic commodity in the act (or a product of which is so designated) kept on the farm for sale (or for the sale of the product thereof).

It was specified that the contract signer in 1934 should not increase the number of feeder pigs bought by him above the average number for 1932 and 1933. The contract also contained limitations to prevent offsetting increases in the production of corn and hogs on non-contracted land of contract signers.

When severe drought conditions developed, however, the restrictions on crop acreage, not in corn, were modified or suspended. The limitations on the purchase of feeder pigs by contract signers also were suspended during the summer in order to permit unlimited transfer of unfinished pigs from emergency drought areas to other areas where feed production was more nearly normal.

IV. DEMOCRATIC NATURE OF ADMINISTRATIVE SET-UP

It is in the spirit of the Agricultural Adjustment Act that producers themselves should play a large part in the administrative organization for carrying out crop-adjustment programs. The emergency hog-buying program and the corn-loan plan had not required a large degree of producer cooperation. But it was obvious that in the case of the 1934 corn-hog contract the individual producer would be directly concerned with the details. Therefore the Agricultural Adjustment Administration developed an organization, democratic in nature, which placed most of the work in the hands of local producers.

The initial administrative set-up was composed of: (1) State committees, appointed by the Secretary of Agriculture in States in the main corn-hog producing area (or the State extension director in place of this committee, in States outside that area); (2) county committees; and (3) community committees—usually one to each township—established by appointment within the State or by election at local meetings.

After the first meetings for signing contracts, producers who had signed elected permanent community committees in a given county of from 3 to 5 members each. The chairmen of the community committees became directors of a county corn-hog control association. At the first meeting of the directors, this association was organized to supplant the temporary county committees. The association elected a president, vice president, secretary, and treasurer, and a county allotment committee.

These production-control associations became the permanent key units in the adjustment program. Upon signing a contract, each producer participating in the 1934 program became a member of his county association.

DUTIES OF ALLOTMENT COMMITTEES

The allotment committee was charged with responsibility for checking and, where necessary, for making adjustments in the contracts filed in the county and for making recommendations to the Secretary in regard to such contracts. This committee also had the duty of preparing for the Adjustment Administration certified records of the total 1934 corn acreage in production, the acreage to be taken out of production by contract, the corn-reduction payments, and hog-reduction payments for the county. The board of directors decided appeals of contract signers, authorized expenditures, and prepared an association budget for county administrative expenses, subject to the approval of the Adjustment Administration.

The community committeemen were delegated to help with local meetings and to assist in filling out contracts, appraising contracted acres, checking and adjusting data, and performing other duties assigned by the county allotment committee or the Adjustment Administration.

Early in 1934, producer committees and others were ready to begin putting the new control program into effect.

STEPS IN LAUNCHING PROGRAM

The first step was the holding of a series of community meetings by extension workers and county agricultural agents. In these meetings the details of the corn-hog problem and the 1934 contract were fully presented to producers. Next followed the preparation of data for contracts. This involved filling out records on past production, and gathering supporting evidence.

Finally, the committeemen helped producers to insert the proper figures in the contract forms, after which the producer affixed his first signature, which constituted an application for acceptance of the contract.

After it had been checked and any necessary adjustments had been made by the county allotment committee, the contract was returned to the producer for a second signature, constituting his acceptance of the contract in its final form. It was then forwarded to the Secretary of Agriculture for approval and payment.

In order to expedite the distribution of payments, however, some producers, at the time of affixing their first signatures, also signed a waiver or advance acceptance of any subsequent adjustments in data that might have to be made by the county allotment committee and the Agricultural Adjustment Administration. In such cases it was possible to pay the first instalment of the payments before the checking and adjustment of data in the contract had been completed.

PARTICIPATION BY PRODUCERS

The degree of participation by producers in the 1934 contract sign-up proved to be high. In the Middle West, where the bulk of the commercial supplies of corn and hogs are grown, between 80 percent and 90 percent of the annual average production was brought under control. Over the entire country, control was extended to about 55 percent of corn acreage and between 75 and 80 percent of hog production.

The total number of contracts represented about 1,155,000 farms scattered over the entire 48 States. In total payment and number of producers involved, the 1934 corn-hog program was the largest of all voluntary production-control programs during the year. (See table 22.)

TABLE 22.—*Preliminary summary of 1934 corn-hog production adjustment program*

State and division	Number contracts accepted for examination and audit	Contract signers' base acreage (average 1932-33), as adjusted	Contracted acres	Contracted acreage as a percentage of contract signers' adjusted base acreage	Average appraised yield per acre on contracted acreage, as adjusted	Estimated total corn adjustment payment made on contracted acreage under 1934 contract	Contract signers' average market hog production for base period, as adjusted	Estimated total hog adjustment payment made on contract signers' 1934 production allotment
Maine.....	7	30					1,340	\$5,000
New Hampshire.....	184	438	5	1.1	60.0	\$90	11,669	43,800
Vermont.....	545	2,270					20,879	78,300
Massachusetts.....	234	504	4	.8	36.0	43	126,212	473,300
Rhode Island.....	10	15					1,440	5,400
Connecticut.....	92	433	20	4.6	34.7	200	15,611	58,500
New York.....	1,877	13,769	590	4.3	33.2	5,900	85,009	318,800
New Jersey.....	307	4,674	1,115	23.9	40.6	13,600	105,584	395,900
Pennsylvania.....	2,664	56,534	12,282	21.7	38.4	141,500	103,966	389,900
NORTH ATLANTIC.....	5,920	78,677	14,016	17.8	38.4	160,333	471,710	1,768,900
Ohio.....	64,404	1,997,868	452,308	22.6	37.3	5,061,300	3,319,210	12,447,000
Indiana.....	83,433	3,118,471	715,620	22.9	35.8	7,685,800	4,698,732	17,620,200
Illinois.....	120,808	7,094,632	1,625,469	22.9	36.3	17,701,400	6,006,075	22,522,800
Michigan.....	24,307	424,702	79,197	18.6	32.6	774,500	720,297	2,701,100
Wisconsin.....	42,945	961,947	157,337	16.4	36.0	1,699,200	1,647,231	6,177,100
NORTH CENTRAL EASTERN.....	335,897	13,597,620	3,029,931	22.3	36.2	32,922,200	16,391,545	61,468,200
Minnesota.....	79,574	3,586,534	802,455	22.4	31.7	7,631,300	3,625,619	13,596,100
Iowa.....	173,565	10,576,079	2,472,720	23.4	38.6	28,634,100	12,067,815	45,254,300
Missouri.....	107,998	4,313,855	1,080,114	25.0	25.5	8,262,900	4,577,179	17,164,400
North Dakota.....	19,726	794,468	173,794	21.9	17.4	907,200	584,211	2,190,800
South Dakota.....	59,164	4,109,333	1,045,045	25.4	17.0	5,329,700	2,357,207	8,839,500
Nebraska.....	88,600	7,878,940	1,860,218	23.6	23.8	13,282,000	4,513,236	16,924,600
Kansas.....	78,671	4,429,194	1,084,502	24.5	18.9	6,149,100	2,919,209	10,947,000
NORTH CENTRAL WESTERN.....	607,298	35,688,403	8,518,848	23.9	27.5	70,196,300	30,644,476	114,916,700
Delaware.....	230	7,559	1,890	25.0	33.1	18,800	5,364	20,100
Maryland.....	3,108	90,887	21,229	23.4	36.2	230,500	89,516	335,700
Virginia.....	10,551	231,228	54,900	23.7	29.4	484,200	295,316	1,107,400
West Virginia.....	2,169	44,999	10,324	22.9	34.9	108,100	64,514	241,900
North Carolina.....	4,091	107,977	23,378	21.7	24.3	170,400	153,817	576,800
South Carolina.....	1,644	94,165	22,218	23.6	16.3	108,600	79,268	297,300
Georgia.....	565	43,329	9,592	22.1	11.1	31,900	39,416	147,800
Florida.....	1,597	82,081	20,658	25.2	14.2	88,000	62,964	236,100
SOUTH ATLANTIC.....	23,955	702,225	164,189	23.4	25.2	1,240,500	790,175	2,963,100
Kentucky.....	23,156	779,349	193,588	24.8	26.6	1,544,800	776,373	2,911,400
Tennessee.....	23,610	716,832	179,103	25.0	24.9	1,337,900	610,396	2,289,000
Alabama.....	2,833	123,543	28,219	22.8	13.2	111,700	96,694	362,600
Mississippi.....	256	16,553	3,886	23.5	18.5	21,600	12,747	47,800
Arkansas.....	11,034	200,056	45,424	22.7	20.7	282,000	247,221	927,100
Louisiana.....	481	23,102	5,676	24.6	16.9	28,800	11,943	44,800
Oklahoma.....	36,940	996,346	231,567	23.2	17.3	1,201,800	1,082,259	4,058,500
Texas.....	32,002	823,996	207,410	25.2	18.2	1,132,500	997,265	3,739,700

TABLE 22.—*Preliminary summary of 1934 corn-hog production adjustment program—Continued*

State and division	Num- ber con- tracts accepted for exam- ination and audit	Contract signers' base acreage (average 1932-33), as ad- justed	Con- tracted acres	Con- tracted acreage as a per- centage of con- tract sign- ers' ad- justed base acreage	Aver- age ap- praised yield per acre on con- tracted acreage, as adjust- ed	Estimated total corn adjust- ment pay- ment made on con- tracted acreage under 1934 contract	Contract signers' average market hog pro- duction for base period, as adjusted	Estimated total hog adjust- ment pay- ment made on contract signers' 1934 pro- duction allotment
SOUTH CENTRAL...	130,312	3,679,777	894,873	24.3	21.1	\$5,661,100	3,834,898	\$14,380,900
Montana.....	4,304	55,210	14,195	25.7	16.3	69,400	153,184	574,400
Idaho.....	9,544	20,590	2,603	12.6	34.7	27,100	359,172	1,346,900
Wyoming.....	3,067	163,597	41,574	25.4	14.3	178,400	74,993	281,200
Colorado.....	13,120	1,159,943	309,900	26.7	12.2	1,134,200	421,042	1,578,900
New Mexico.....	2,574	130,810	35,343	27.0	19.9	202,500	65,592	246,000
Arizona.....	334	2,435	536	22.0	23.7	3,800	20,382	76,400
Utah.....	2,752	3,466	343	9.9	25.0	2,600	61,771	231,600
Nevada.....	284	457	115	25.2	56.8	2,000	16,883	63,300
Washington.....	5,029	3,059	607	19.8	36.3	6,600	212,260	796,000
Oregon.....	6,123	21,372	1,714	8.0	35.9	18,500	229,165	859,400
California.....	4,781	5,776	1,209	20.9	34.2	12,400	571,827	2,144,400
WESTERN.....	51,912	1,556,815	408,139	26.0	13.5	1,657,500	2,186,271	8,198,500
UNITED STATES...	1,155,294	55,313,507	13,029,996	23.6	28.6	111,838,933	54,319,075	203,696,300

As had been anticipated, some difficulty was encountered in checking and adjusting contract data. In many communities, the total production and acreage indicated by data in the contracts exceeded the Government estimates of what production and acreage should be. Some arithmetical errors and errors in tabulation were discovered, but for the most part discrepancies seemed to be due to overstatement, either intentional or unintentional.

Most instances of overstatement concerned the hog part of the contract, largely because of lack of sufficient detail in marketing records. Feeder pigs or hogs farrowed before the beginning of the base period frequently were incorrectly added to the producer's true hog base. Regardless of the degree of error, however, overstatement had to be corrected to keep the production allotments and adjustment payments on an equitable basis both among individuals and among areas.

CORRECTING OVERSTATEMENTS NOT EASY

This task of correcting overstatement was not easy. Equitable adjustment required that large numbers of contracts be examined individually. Supporting evidence had to be carefully rechecked. Flat cuts in the allotments of all producers in a county were properly regarded as last-resort measures.

Although records of hog production for a given area were available, official records of individual hog production were not available prior to the 1934 program.

Making individual adjustments required unusual judgment, patience, and tact on the part of the corn-hog committeemen in charge. But, notwithstanding their lack of previous experience, committeemen fulfilled their function very satisfactorily. This is an especially significant indication of the potential capacity of farmers for self-government and economic democracy. Checking and adjusting

production data in the 1934 corn-hog contracts was perhaps the most severe test that could have been applied to the machinery of voluntary production control.

Besides the local committees, a corn-hog board of review was formed in each State. The board was made up of at least three members, one of whom was the Federal statistician for the State, another a representative from the State extension service or agricultural college who had had some economic and statistical training, and the third, a representative farmer.

This board of review supervised and directed the work of tabulating and compiling data from contract signers in each county. It also assembled statistics that were gathered from nonsigners in order to establish a more reliable basis for determining necessary adjustments in contract signers' figures. Principally through assistant statisticians and field representatives of the extension service, the State corn-hog board of review examined and analyzed the contracts as they were received in each county office. The board issued final approval of the contracts after they had been properly adjusted. They were then transmitted to the Secretary of Agriculture for acceptance and payment.

FIRST CHECKS TO CONTRACT SIGNERS IN APRIL

Because of the extensive work involved in checking and adjusting contracts, the distribution of the first instalment of payments under the 1934 corn-hog contract—that is, one-half of the total corn payment and two-fifths of the total hog payment—was delayed several months beyond the date originally anticipated.

Distribution of 1934 corn-hog checks began in April with the arrival of the "early-pay" contracts which carried the waiver of second signatures by producers. But the bulk of payments was not made until midsummer or later. Mailing of contracts to the Secretary of Agriculture extended over a longer period than had been expected. Furthermore, the time required for examining the total of over 1,000,000 contracts and writing checks was considerable.

However, the distribution of checks for the second instalment began shortly after the date when they were due, November 15, 1934. Most of the local committeemen had promptly submitted the required follow-up reports in advance of the due date, certifying that the individual producers had complied with the corn-acreage provisions of their contracts.

The final instalment becomes due on February 1, 1935, and arrangements were made for beginning payment soon after.

Hog payments under the 1934 contract will total approximately \$203,700,000. Corn payments under the 1934 contract will total approximately \$111,840,000. The grand total of benefit payments will therefore amount to about \$315,540,000.

The degree of noncompliance with the 1934 contract provisions has been slight. The most common violation in the case of corn was the planting of an excessive acreage for harvesting as grain. In some cases, farmers exceeded the maximum acreage allowed for other basic crops such as wheat. In some instances, the contract signer failed to keep down objectionable weeds on the contracted acreages or failed to comply with certain other miscellaneous provisions.

PRINCIPAL CLASSES OF VIOLATIONS

In the case of hogs, there were three principal classes of violations: (1) Production of hogs in excess of the contract maximum; (2) purchase of feeder pigs from noncontract signers to fill up producer's allotment before the limitation on feeder-pig purchases was lifted on August 1; and (3) purchase of an excessive number of feeder pigs from signers before the purchase limitation was lifted.

Excess pigs produced by the signers' sows were given to relief agencies in most cases, in accordance with the compliance options offered under the program. In some cases where only a few excess pigs were involved, there was deducted from the producer's adjustment payment the sum of \$20 for each pig in excess of his allotment.

V. BENEFITS TO GROWERS RESULTING FROM PROGRAM

What effect did the 1934 corn-hog production-adjustment program have on production and prices? Did it aggravate the conditions which followed the drought?

The total reduction in hog production among all farmers from 1934 litters, according to the Government report of December 1, 1934, is expected to be about 25 million head below the average production of recent years. The aggregate adjustment required of producers under the 1934 contract was approximately 13 million head. A little over one-half of the total expected reduction, therefore, is represented by the contract requirements.

The additional reduction beyond contract requirements is the result of action on the part of both signers and nonsigners to adjust to the feed shortage occasioned by drought in some sections in 1933 and by the general drought in 1934.

TABLE 23.—United States average farm price of hogs per hundredweight, processing-tax rate, and fair-exchange value, by months

Month	1933			1934		
	Farm price ¹	Process- ing-tax rate ²	Fair-ex- change value ³	Farm price	Process- ing-tax rate ²	Fair-ex- change value
January.....	\$2.68	-----	\$7.36	\$3.06	\$1.00	\$8.45
February.....	2.94	-----	7.29	3.87	1.50	8.59
March.....	3.22	-----	7.22	3.88	2.25	8.66
April.....	3.21	-----	7.29	3.49	2.25	8.66
May.....	3.88	-----	7.36	3.17	2.25	8.74
June.....	3.96	-----	7.44	3.52	2.25	8.74
July.....	3.98	-----	7.73	3.97	2.25	8.81
August.....	3.79	-----	8.09	4.61	2.25	9.02
September.....	3.73	-----	8.38	6.04	2.25	9.10
October.....	4.17	-----	8.38	5.20	2.25	9.10
November.....	3.70	\$0.50	8.38	5.04	2.25	9.10
December.....	2.92	1.00	8.38	5.15	2.25	9.10

¹ Monthly average farm price as of the 15th day for each month reported in The Agricultural Situation, issued by the Bureau of Agricultural Economics, U. S. Department of Agriculture.

² Processing-tax rate of 50 cents per hundredweight became effective Nov. 5, 1933; subsequently increased to \$1 per hundredweight, Dec. 1, 1933; to \$1.50 on Feb. 1, 1934; and finally to \$2.25 per hundredweight on Mar. 1, 1934, where it has since continued. Benefit payments to farmers are made out of the processing-tax collections, all of which have been appropriated to the Secretary of Agriculture.

³ Fair exchange value computed by taking index of average prices farmers pay for each month (expressed in percentage of pre-war), times \$7.22 per hundredweight, the average farm price of hogs during the August 1909-July 1914 period.

Hog slaughter has only recently begun to reflect the 1934 adjustment in both spring and fall farrowings. Therefore, it is not yet possible to determine the final effect of the adjustment program on either price or income. This adjustment certainly will influence marketings until well along in 1935. There are indications thus far that both price and income may be favorably affected.

Between the fall of 1933 and the fall of 1934, the value of hogs per hundredweight advanced materially. (See table 23.)

This upward trend in price represents a gradual fulfillment of the primary objective of the Agricultural Adjustment Act—raising and maintaining the unit value of basic commodities, including corn and hogs, to a fair-exchange level. (See figure 21.) The level chosen is that at which a bushel of corn or a hundredweight of live hogs at the farm will have the same exchange value with respect to articles farmers buy that it had in the pre-war period (1910–14). In December 1934 the fair-exchange value of hogs on this basis was \$9.10 per hundredweight.

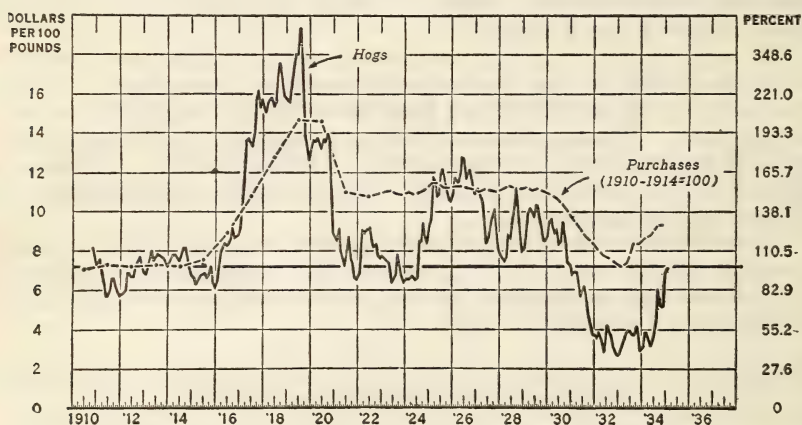


FIGURE 21.—Farm price of hogs and index numbers of prices paid by farmers, 1910 to 1935.

PRONOUNCED ADJUSTMENTS IN CORN PRODUCTION

At the same time that material adjustments were being made in hog production in 1934, and prices were resuming an upward trend, still more pronounced adjustments were taking place in corn production. (See table 24.)

The total area planted to corn in the United States in 1934 was about 92,526,000 acres; that is, about 13,000,000 acres less than the 1932–33 average of 105,500,000 acres. Practically all of this reduction was acreage taken out of production under contract with the Secretary of Agriculture.

Those who did not sign contracts represented about 45 percent of the corn acreage and about 40 percent of the annual production in the United States. Apparently those nonsigners made no significant reduction in their total corn acreage below the 1932–33 average. The average reduction among signers, on the other hand, was nearly 24 percent. This is more than the minimum requirement because adjustments up to 30 percent were made by some producers.

TABLE 24.—United States average farm price of corn per bushel, processing-tax rate, and fair-exchange value, by months

Month	1933			1934		
	Farm price ¹	Process- ing-tax rate ²	Fair- exchange value ³	Farm price	Process- ing-tax rate	Fair- exchange value
	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>
January.....	19.1	-----	65.5	43.9	5.0	75.1
February.....	19.4	-----	64.8	45.6	5.0	76.4
March.....	20.6	-----	64.2	47.1	5.0	77.0
April.....	28.2	-----	64.8	47.1	5.0	77.0
May.....	38.9	-----	65.5	48.6	5.0	77.7
June.....	40.2	-----	66.1	56.0	5.0	77.7
July.....	55.4	-----	68.7	59.2	5.0	78.3
August.....	48.8	-----	71.9	72.7	5.0	80.2
September.....	46.5	-----	74.5	77.4	5.0	80.9
October.....	38.8	-----	74.5	76.7	5.0	80.9
November.....	40.6	5.0	74.5	75.7	5.0	80.9
December.....	42.0	5.0	74.5	85.3	5.0	80.9

¹ Monthly average farm price as of the 15th day in each month reported in The Agricultural Situation, issued by the Bureau of Agricultural Economics, U. S. Department of Agriculture.

² Processing tax at rate of 5 cents per bushel became effective Nov. 5, 1933.

³ Fair-exchange value computed by taking index of average prices farmers pay for each month (expressed in percentage of pre-war) times 64.2 cents per bushel, the average farm price of corn during the August 1909 to July 1914 period.

DROUGHT CUT CORN CROP

If yields had been normal in 1934, the total corn production on the adjusted acreage would have been held to about 2,200,000,000 bushels; that is, between 350,000,000 and 375,000,000 bushels under the 2-year average production of approximately 2,600,000,000 bushels. This reduced total production would have been in good balance with requirements, in view of the corresponding adjustment in hog numbers planned simultaneously.

On account of the severe drought, however, the 1934 corn crop, instead of being about 2,200,000,000 bushels, actually was about 1,320,000,000 bushels, or nearly 1,200,000,000 bushels under the 2-year average. Thus in 1934 nearly three-fourths of the actual change in corn production from the 2-year average was due to the drought.

In the face of the unexpected and severe drought the corn-hog program, instead of intensifying the drought effects, proved to be of material help in easing the resulting shortage of feed. Without the control program, farmers would not have made so large an advance adjustment in hog farrowings as they actually did make in the spring of 1934, and the shortage of feed would have been more acute when drought conditions developed. Heavier liquidation of stock at lower prices would have taken place and the loss to producers in labor and money already invested in pigs would have been extremely large.

ADJUSTMENT PREVENTS SURPLUS PRODUCTION

After June 8, because of the emergency feed situation created by drought, contract signers were permitted to plant on other than contracted acres, for roughage purposes not to be harvested for grain, an acreage of corn in excess of the total corn acreage permitted by the contract. On June 30, in view of the increasing intensity of drought, the same plantings were authorized on the contracted acres.

The eventual production of feed from these various emergency plantings tended to offset to a large extent the 200,000,000 bushels of corn which, at the low 1934 yield, might have been raised from the 13,000,000 contracted acres if no control program had been in effect.

Many of the emergency crops planted were more drought-resistant than corn and produced more feed than corn would have produced. Much of the land lying idle or being summer-fallowed had conserved moisture and was in good condition to produce quick-growing forage crops.

This is not to suggest that the experience in 1934 has proved acreage control is ineffectual. Instead, it demonstrates the beneficial effects of adjustment programs in drought periods as well as in years of more normal weather. It is true that a substantial change in acreage is a minor factor in the change in total production during a drought year, but it is also true that, in the event of normal weather, acreage control very effectively prevents surplus production and would have done so under normal conditions during the past year.

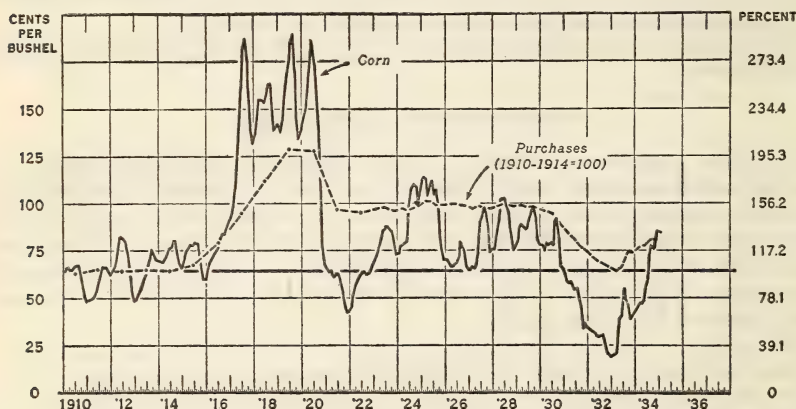


FIGURE 22.—Farm price of corn and index numbers of prices paid by farmers, 1910 to 1935.

As a consequence of the sharp drop in all crop-production prospects, corn prices continued to advance through the spring and summer months of 1934 at a somewhat faster rate than livestock prices. The average value of corn per bushel at the farm at the close of 1934 stood at about 85 cents as compared with 44 cents at the beginning of the year. (See figure 22.) As already pointed out, the drought was the predominant factor affecting supplies of corn.

PRODUCER'S INCOME RECEIVED IN TWO PARTS

The increased income resulting from the adjusted corn and hog production is coming to contracting producers in two ways—first, as a direct return from the sale of the commodity at the open-market price; second, in benefit payments derived from the proceeds of the processing taxes, appropriated to the Secretary of Agriculture.

The release of purchasing power made possible by corn-hog checks eventually works back through wholesale houses and transportation agencies to factories and to workers' pay rolls. There is an impetus to reemployment all along the line. Agricultural adjustment has

effectively demonstrated during the first year that although it is primarily in the interest of farmers, it also is promoting the general welfare.

An accomplishment in 1934 which ranks with importance in the raising of corn and hog values through adjustment was the Nation-wide organization of corn-hog producers into county control associations. Over 1 million farmers thus were brought into direct contact with broad problems affecting their business, and made more keenly aware of the nature of these problems.

They discussed the loss of the export market, the facts underlying this loss, and its consequences. They learned that production control is essential and that only the producers themselves, working together, can effectually exert this control. During the year, they saw production adjustment effectively demonstrate its capacity for raising prices.

The framework of the vast producer organization is made up of the thousands of local committeemen elected by farmers from their own ranks. There are 2,182 county corn-hog control associations throughout the United States today. It is estimated that there are not less than 20,000 community committees and about 75,000 community committeemen.

Despite many necessary first-year expenditures for equipment and extended committee work, the average total county budget for completing the 1934 program in the States will run in the neighborhood of 4 to 5 percent of the contract signer's benefit payments. Administrative expenses vary from county to county, however, since the budget within each county is determined by the board of directors of its own control association to suit its particular needs.

VI. PROCESSING TAXES

Benefit payments under the corn-hog adjustment program, and expenditures in the emergency and supplemental purchase operations, have been derived from funds appropriated to the Secretary of Agriculture for such uses, under the provisions of the Agricultural Adjustment Act, which appropriates to the Secretary the proceeds of processing taxes on basic commodities, and makes available to him other funds from direct appropriations, as well.

The rate of the processing tax on hogs was set at 50 cents per hundred pounds, live weight, when the tax went into effect on November 5, 1933. This rate was changed to \$1 on December 1, 1933, to \$1.50 on February 1, 1934, and to \$2.25 per hundred pounds, live weight, on March 1, 1934.

The rate of the tax on corn, which also went into effect on November 5, 1933, was set at 5 cents per bushel, and has not been changed.

It was at first expected that the corn processing tax rate would probably be increased on December 1, 1933, to 20 cents per bushel, but this increase was indefinitely postponed when subsequent investigation indicated that such increase would tend to cause a reduction in the consumption of corn and would tend to result in the accumulation of surplus stocks. The corn processing tax, therefore, was continued unchanged at 5 cents per bushel.

Total tax collections on the processing of corn during the first marketing year beginning, for tax purposes, on November 5, 1933,

amounted to about \$6,250,000. Total tax collections on the processing of hogs during the same period amounted to about \$162,000,000.

These amounts do not include all of the processing taxes incurred during the marketing year. Processing-tax returns for any given month are not due until the last day of the month following the actual processing of the commodity, and in some cases the return will not be filed until 2 months after the date of processing.

TIME MAY BE EXTENDED

Furthermore, the Bureau of Internal Revenue, which collects the processing taxes, may, and sometimes does, extend the time for the payment of the tax for a period of not more than 180 days.

In view of the amount of the expenditures in the emergency and supplemental purchase operations during 1933 and 1934, and the commitments of the Government in benefit payments to producers under the 1934 and 1935 contracts, it is expected that the corn and hog processing taxes will be continued at least through 3 marketing years, ending November 4, 1936.

Proceeds from the collection of taxes on the processing of corn and hogs during the first 2 marketing years are expected to be approximately equal to the cost of the emergency and supplemental purchase programs and the benefit payments to be made under the 1934 contracts.

The cost of benefit payments under the 1935 corn-hog contracts is expected to be about equal to the amount of the collections of the processing taxes on corn and hogs during the final marketing year, November 5, 1935, to November 4, 1936. Although the rate of the benefit payments per unit of adjustment in 1935 will be about the same as in 1934, the average total payment per farm will be smaller because the percentage of reduction under the 1935 contracts is smaller.

Corn-tax collections will equal only about 10 to 15 percent of the total of approximately \$112,000,000 in corn adjustment payments under the 1934 contract. The funds for these corn payments will be derived from the processing-tax proceeds and other amounts appropriated to the Secretary of Agriculture under the Adjustment Act.

CORN AND HOG PRODUCTION CLOSELY RELATED

Some producers who specialize in hog production have raised the question why a part of the hog processing tax fund is ultimately to be used to help control corn production. There are two principal reasons.

In the first place, because of the close relationship between corn production and hog production, it would be impossible to maintain the latter in a state of balance for any length of time without adequate control over corn production. This would be true even if all farmers specializing in the hog enterprise should agree to limit farrowings and if as much money as is collected in processing taxes on hogs, were distributed as benefit payments on hog adjustment.

Experience shows definitely that increased corn production invariably leads to increased hog production, with a resultant decrease in price. Relationship between hog production and corn production is shown in figure 23. For a while, hog production might remain in balance with demand in spite of an increase in the supplies of corn.

Inevitably, however, farmers specializing in corn and not participating in the hog-control program would themselves turn to heavier hog production.

They would be prompted by a rise in the price of hogs relative to corn, induced on the one hand by the adjustment in hog numbers and on the other hand by a fall in the price of corn resulting from unrestricted production and lessened feeding demand.

Consequently, even if the benefit payments on hog adjustment were equal to the total proceeds from hog-processing taxes, the advantage to the farmer would sooner or later be more than offset by a drop in the open market price of hogs, caused by increased hog production among those outside the program.

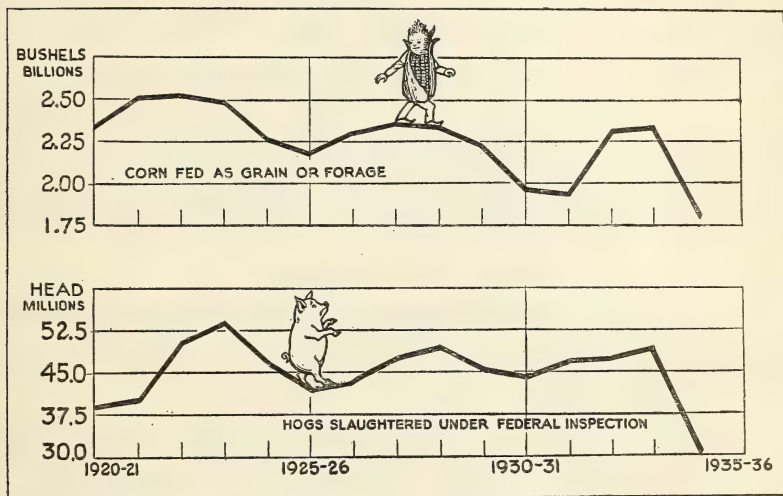


FIGURE 23.—Hog numbers follow changes in corn production.

SMALL VOLUME OF CORN SUBJECT TO TAX

In the second place, it is not practicable to collect from the corn-processing tax alone funds equal to the payments required by an adequate corn-adjustment program. Only the moderate volume of corn which enters commercial and industrial trade channels and is actually milled is subject to tax. This volume subject to tax is less than 10 percent of the annual corn crop.

The processing taxes are collected by the Bureau of Internal Revenue, United States Treasury Department, and are payable by the individual, association, or corporation, doing the first domestic processing of the commodity involved.

The processing tax on hogs, therefore, is payable by (1) meat packers or other slaughterers; (2) farmers who prepare hog products and sell them to or exchange them with consumers; and (3) commercial handlers who buy products from hogs slaughtered by farmers and become liable for the tax upon preparing the products for distribution or use.

In the case of corn the processing tax is payable by the milling establishments, custom grinders of corn, and in certain instances, farmers, who mill or otherwise process the corn for market (except

cleaning and drying). Processing includes cutting, grinding, cracking, breaking by mechanical or other means, and custom milling for toll as well as commercial milling. The term, "first domestic processing" as applied to corn, however, does not include cutting, grinding, cracking, or breaking the corn for feed purposes only, so long as the product does not assume the form of flour.

EXEMPTIONS FROM TAX SPECIFIED

The Government does not collect a processing tax on hogs butchered or corn prepared by or for producers for their own consumption. No tax payment is required on the grinding of 1 bushel of corn or less per week for the producer thereof, regardless of the purpose for which it is ground. Likewise, no tax payment is required on the grinding of any volume of corn for feed purposes only.

A change in the hog-processing tax regulations, effective as of November 1, 1934, placed the liability for the tax with respect to hog products sold by producers or feeders to commercial handlers upon the commercial handlers' initial act in preparing such products for distribution or use. Farmers now are liable for the tax when they have prepared hog products derived from hogs they have produced or fed only when they sell such products directly to consumers.

PRODUCER EXEMPTION

The producer who slaughters his own hogs and who sells directly to or exchanges directly with consumers not more than 300 pounds of the products derived therefrom during any marketing year is not required to pay a tax.

If he sells not more than 1,000 pounds directly to consumers, he is liable for a tax only on the volume sold in excess of 300 pounds. If the producer sells more than 1,000 pounds of the products derived from his hogs during any marketing year, he loses the 300-pound exemption and is liable for the tax on all hogs processed, the products of which were sold directly to consumers.

The foregoing exemptions do not apply to farmers who process hogs not produced by them and who sell the products thereof. However, there is no liability for the processing tax on the part of a person, not a producer, who buys a live hog and has it slaughtered for consumption by his family and who sells none of the products therefrom.

It has sometimes been argued that the hog-processing tax should not be collected from farmers who butcher their own hogs for sale directly to consumers, regardless of how many pounds of products are sold. An unlimited exemption of this sort, however, would tend to disrupt the normal channels of trade. It would discriminate unduly against other legitimate handlers on whose products the tax has already been paid. In the long run, hog producers as a group would lose more than they would gain from unlimited tax exemption.

VII. THE 1935 CORN-HOG ADJUSTMENT PROGRAM

After the 1934 corn-hog production adjustment program had been put under way, it was apparent that for at least three reasons some kind of follow-up program would be desirable.

In the first place, the acres shifted from corn under the 1934 program were not being permanently retired. They were out of corn only

temporarily and without crop control could be quickly brought back into use.

Second, demand for hog products, especially in the world market, was showing slow improvement, but not enough to warrant such material expansion in corn and hog production as would result from abandonment of the control program in 1935.

Third, it was doubtful whether farmers, planning individually, could successfully maintain output at the most profitable level, even after a year's experience with the technique and the benefits of a crop-adjustment plan.

ANOTHER CORN-HOG PROGRAM LOGICAL

By late summer it was clear that the logical follow-up for the grain and livestock farmer in 1935 would be another corn-hog program. It was also becoming more and more clear that the drought would increase rather than decrease the need for continued control. There were several reasons for this.

In view of the marked reduction in 1934 hog farrowings beyond the requirements of the 1934 corn-hog contract and the inauguration of emergency cattle buying in June, it was clear that livestock feed requirements in 1935 would be considerably below average.

But even with the prompt and substantial reduction in livestock numbers, feed supplies per head for the remaining farm animals would be short and high priced. Thus, the stage would surely be set for the usual post-drought expansion in corn acreage.

A final consideration pointing to the advisability of continuing control in 1935 was the historic trend of corn acreage and production following other drought years. Studies showed that the normal response to severe though temporary feed shortages and high feed prices occasioned by a drought had been the planting of a larger-than-average acreage to corn the following year. At the same time, the yields per acre usually returned to normal or near normal, and a burdensome surplus of corn resulted. Corn prices then declined in relation to livestock prices, and within 2 years farmers were on a definite swing back to heavy production of livestock, particularly of hogs.

A typical example of post-drought reaction was found in the large increase in corn acreage in 1895, following the severe drought of 1894. In 1894, as in 1934, the corn crop in the United States was abnormally small. The following season, farmers increased their plantings by 10,500,000 acres. The yield per acre went back to 2 bushels above average. A record crop resulted. The price of corn on December 1, 1895, stood at 25 cents per bushel as compared with 45 cents the year before. By 1897, the production of hogs for slaughter jumped materially and hog prices were lower than they had been in 1894.

POSSIBILITIES OF SURPLUS PRODUCTION

The outlook at midsummer of 1934 indicated that without control farmers in 1935 might plant at least the 1932-33 average of 105,500,000 acres of corn and possibly the old-time high of 111,000,000 acres reached in 1917; whereas estimates of requirements for 1935 showed that with normal yields these requirements could be met with a planted acreage of 85 to 90 million acres. Thus a return to such a relatively high corn acreage would result, with average yields, in one of the largest surpluses over requirements ever produced. The

surplus might amount to more than 700,000,000 bushels as compared with an average surplus for carry-over of only about 150 to 200 million bushels.

Inevitably, with uncontrolled planting and normal yields, corn prices would fall sharply, even before the harvesting of the 1935 crop. Within the following year hog farrowing would increase materially. This increase in hog farrowing would be the more likely because for the first time in many years cattle numbers and hog numbers would both be at a low point simultaneously, and farmers are unable to increase cattle production as rapidly as hog production. It seemed likely, then, that excessive corn production in 1935, and the resulting fall in corn prices, would cause dislocations in the corn-hog industry more violent than any that have followed other post-drought years.

REGIONAL MEETINGS HELD

A series of six regional meetings was held in early September at Kansas City, Indianapolis, St. Paul, Salt Lake City, Atlanta, Ga., and New York. Representatives of the Agricultural Adjustment Administration discussed the economic outlook for 1935 with State corn-hog committeemen, extension workers, and others. The advisability of devising a corn-hog program to prevent a new cycle of surplus and price collapse was considered.

By an almost unanimous vote, the State groups favored a 1935 corn-hog program. Each meeting recommended certain provisions. In general, these recommendations favored—

(1) An adjustment below the base production average somewhat smaller than in 1934, for both corn and hogs.

(2) Smaller total payments on both corn and hogs.

(3) More liberal provisions for the use of the acres shifted from corn production.

(4) More flexibility in administrative rulings.

(5) Provision for adjusting inequities in the determination of corn and hog bases.

At these regional meetings the Administration proposed a direct referendum among all corn-hog producers on the question of developing and offering a new program for 1935. It was generally agreed that the Administration should undertake no new program unless a clear majority of farmers favored such action.

In spite of the newness and scope of the referendum project, the majority of corn-hog committeemen and extension workers declared it could be carried out promptly. Therefore, they favored it.

CONTRACT SIGNERS REGISTER PREFERENCE IN REFERENDUM

Accordingly, the first 2 weeks in October were set aside for the referendum. Except in areas where corn-hog contract signers were few and widely scattered, community meetings were called. Information on the 1935 outlook was discussed. Then a secret written ballot was taken.

The final results, tabulated from certified State reports, showed that 374,584 contract signers, or 69.9 percent of the 535,690 signers voting, had voted in favor of continuing corn-hog adjustment in 1935. The total number of signers voting represented more than 46 percent of all 1934 contract signers. Of the 44,026 nonsigners voting in the referendum 14,555, or 33.1 percent, favored an adjustment program dealing with corn and hogs in 1935. The figures by States are given in table 25.

TABLE 25.—Results, by States, of 1934 Corn-Hog Referendum on the question: "Do you favor an adjustment program dealing with corn and hogs in 1935?"

State	Contract signers			Percent of all 1934 contract signers voting	Nonsigners		
	Yes	Percent	No		Yes	Percent	No
Alabama.....	1,382	94.7	77	52.1			
Arizona.....	40	100.0		13.3			
Arkansas.....	4,264	87.1	634	47.7	210	87.5	30
California.....	1,387	89.4	164	32.0	70	76.9	21
Colorado.....	3,403	77.3	1,001	33.1			
Connecticut.....	63	87.5	9	72.0			
Delaware.....	206	99.5	1	90.0			
Florida.....	721	94.0	46	51.1	20	95.2	1
Georgia.....	177	99.0	2	31.7	51	100.0	
Idaho.....	2,554	68.0	1,210	39.6			
Illinois.....	33,602	75.2	11,111	37.3	2,227	47.1	2,504
Indiana.....	25,920	64.8	14,082	48.8	1,429	35.7	2,572
Iowa.....	64,579	71.7	25,528	51.2	2,607	36.5	4,527
Kansas.....	17,429	46.6	19,985	48.2	1,117	21.3	4,130
Kentucky.....	8,313	92.7	654	56.0	524	78.6	143
Louisiana.....	227	79.9	57	58.4	1	33.3	2
Maine.....	4	57.1	3	100.0			
Maryland.....	840	88.7	107	30.0			
Massachusetts.....	112	96.6	9	48.4			
Michigan.....	4,633	60.1	3,071	31.8	54	47.0	61
Minnesota.....	26,702	73.2	9,779	56.2	485	50.7	472
Mississippi.....	156	96.9	5	59.4			
Missouri.....	32,753	67.3	15,918	44.4	1,566	31.4	3,424
Montana.....	1,307	81.5	297	40.1	22	34.9	41
Nebraska.....	27,327	50.8	26,490	60.5	2,168	18.6	9,517
Nevada.....	109	92.4	9	40.2	15	78.9	4
New Hampshire.....	50	67.6	24	37.0			
New Jersey.....	143	84.6	26	56.3			
New Mexico.....	951	93.6	65	39.1	64	84.2	12
New York.....	466	59.3	320	40.3			
North Carolina.....	1,566	91.8	135	38.3			
North Dakota.....	9,047	88.3	1,201	51.6	135	78.5	37
Ohio.....	16,423	58.5	11,646	42.6	330	23.8	1,058
Oklahoma.....	11,045	70.0	4,743	42.1	186	28.4	470
Oregon.....	1,037	55.4	836	32.5			
Pennsylvania.....	1,099	84.3	205	52.3	8	53.3	7
Rhode Island.....	8	80.0	2	100.0			
South Carolina.....	513	85.8	85	35.2			
South Dakota.....	23,527	86.8	3,570	54.2	279	81.8	62
Tennessee.....	9,374	86.4	1,478	49.1			
Texas.....	17,097	91.0	1,694	62.4	789	74.8	266
Utah.....	969	91.2	94	38.5			
Vermont.....	235	69.3	104	67.8			
Virginia.....	3,573	87.7	500	38.4	126	67.0	62
Washington.....	1,331	83.3	266	31.0	22	44.9	27
West Virginia.....	517	71.2	209	36.3			
Wisconsin.....	16,351	83.5	3,239	45.6	50	70.4	21
Wyoming.....	1,052	71.7	415	45.8			
Total.....	374,584	69.9	161,106	46.2	14,555	33.1	29,471

Immediately after the votes were counted, a group of farm leaders and a number of State corn-hog committeemen from the leading corn and hog States reviewed the results of the referendum with the Administration. They reached the conclusion that the immediate development of a new program for 1935 was warranted, and in collaboration with the State corn-hog representatives, the Administration began work on a new contract. On November 15, the terms of the contract were announced.

A series of instructional meetings with State corn-hog committeemen and extension workers was held in December. These meetings were held in Kansas City, Minneapolis, Indianapolis, Salt Lake City, New York, and Atlanta. The State workers in turn arranged meetings with county workers, at which the means and procedure for handling the 1935 program were explained, and plans were made for starting the contract sign-up.

PROVISIONS OF 1935 CONTRACT

The 1935 contract provides that the producer signing agrees to—

(1) Plant to corn, on the farming unit to be operated in 1935, not more than 90 percent of the average corn acreage planted during the base years, 1932 and 1933 (the same base years used in 1934).

(2) Produce for market, from litters farrowed in 1935 on the farming unit under contract, not more than 90 percent of the adjusted annual average number of hogs produced for market from litters owned by the producer when they were farrowed during the base period, December 1, 1931, to December 1, 1933 (the same base period used in 1934).

The new hog allotment of 90 percent of the base is one-fifth larger than the 1934 allotment, which was 75 percent of the base. The new corn acreage maximum of 90 percent of the 2-year average represents an increase of about one-eighth over the 1934 maximum, which was 80 percent of the base acreage.

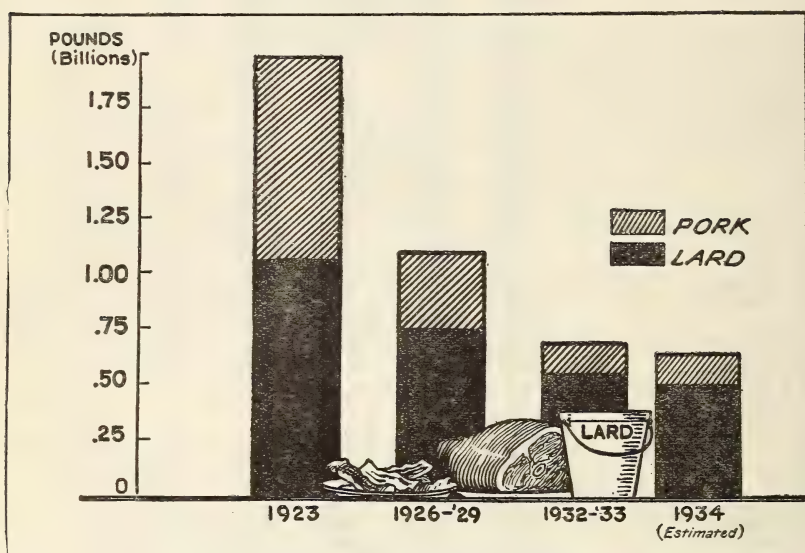


FIGURE 24.—United States exports of pork and lard for selected years.

MODIFICATION IN HOG ADJUSTMENT PROVIDED

Some modification in the percentage of hog adjustment asked of individual producers was regarded as desirable to help offset the reduction beyond contract requirements made during the past year by both signers and nonsigners which was in large part caused by the feed shortage due to the drought.

However, the existing demand does not yet warrant a large reexpansion in hog production. Shipments abroad remain at about three-fourths billion pounds as compared with nearly 2 billion pounds in the early post-war period. Exports of pork from the United States showed a slight upward trend in 1934, but this was offset by a decline in the exports of lard. (See fig. 24.) Nor in the domestic market, is there any prospect of an increase in demand for food sufficient to warrant an increase in livestock numbers up to the average of 1932-33.

In computing the new corn-acreage maximum for 1935, consideration was given to: (1) Probable requirements for the 1935-36 season; (2) the desirability of a reasonable margin for rebuilding reserves; and (3) the likelihood that the corn yield per acre would return to normal in 1935.

ESTIMATES PROBABLE REQUIREMENTS

Probable requirements were considered first. In view of the adjustments which had already been made or would be made in livestock numbers, and assuming that there would be no material change in the quantity of corn needed for purposes other than feeding, it was estimated that a corn crop somewhere between 2,200,000,000 and 2,300,000,000 bushels would be adequate. In terms of planted area, the probable requirements for the 1935-36 feeding season could be produced on about 85,000,000 to 90,000,000 acres. This is about 20,000,000 acres, or between 15 and 20 percent, less than the 2-year average for 1932-33.

To these basic requirements were added about 250,000,000 bushels, the production of about 10,000,000 acres, for rebuilding the feed reserves now being used up on account of drought. After making allowance for this reserve, and assuming about the same percentage of sign-up in 1935 as in 1934, it appeared that an aggregate adjustment in 1935 averaging about 10 percent under the 1932-33 average would be desirable.

The percentage of adjustment in corn acreage for 1935 was based on the assumption that the corn yield per acre probably will be about normal. Studies of corn production following 3 years of severe drought since 1860, that is 1894, 1901, and 1930, reveal that the yield per acre for the country as a whole returned approximately to normal or better in all three instances. The yields of both barley and oats in these post-drought years returned toward normal in 2 out of 3 instances.

The yield of feed crops for any given year apparently is not closely related to the harvested yield in the preceding year. It is therefore reasonable to expect normal yields on acres planted in 1935. There are likely to be instances of local drought conditions in some sections in 1935, just as there are such conditions every year, but there is no reason at this time to expect a subnormal yield for the country as a whole.

BENEFITS COOPERATING PRODUCERS WILL RECEIVE

For maintaining corn acreage and hog production within the limits of the 1935 contract, the cooperating producer will receive the following benefits:

(1) In the case of hogs, (a) a hog adjustment payment at the rate of \$15 per head on the number of hogs represented by the adjustment, that is, 10 percent of the hog base, and (b) the privilege of making unlimited purchases of feeder pigs.

(2) In the case of corn, (a) an adjustment payment at the rate of 35 cents per bushel on the yield estimated for the acres shifted from corn production, (b) unrestricted use of all land not in corn, including the acres shifted, and (c) eligibility to participate in any Government corn-loan program that may be made available in the fall of 1935, similar to the loans made available during the past 2 years by the Commodity Credit Corporation.

The hog payment in 1935 will be the same as in 1934. The 1934 hog payment of \$5 per head on 75 percent of the 2-year average was

equivalent to \$15 per head on the 25 percent adjustment in 1935. The 1935 corn payment of 35 cents per bushel on the estimated yield of acres shifted from corn is 5 cents per bushel higher than that of 1934, in consideration of the relatively high current price of corn.

Corn payments in 1935 will be calculated on the average estimated yield per acre of all crop land on the farm that has been used for corn at least once during the past 5 years.

In making an appraisal for a particular farm, the committee will ascertain what area has been in corn at least once during the years 1930-34, inclusive, and then estimate what the average yield of this entire area would be if all of it were in corn in 1935—assuming that weather conditions and other factors affecting yield would be similar in 1935 to the average for the 10-year period, 1924-33.

UNRESTRICTED USE OF LAND NOT PLANTED TO CORN

In 1934 the basis for payment was the average yield estimated for the particular acres kept out of corn production and contracted to the Secretary of Agriculture. The basis was changed this year because the acres shifted from corn production are not to be set aside and limited to certain uses.

The 1935 contract provides that: (a) The corn acres may be located on any part of the farm; (b) a definite tract of land equal to the adjustment in corn acreage will not have to be set aside for limited use and designated as "contracted acres" as was the case in 1934; (c) no limitation is placed on the total acreage of any basic crop other than corn; and (d) no limitation is imposed on the total acreage planted to nonbasic crops. Furthermore, the 1935 contract imposes no limitation on the number of livestock, other than hogs, kept for sale of the animals or their products.

It permits unrestricted use of the land not planted to corn, partly to simplify compliance and partly to permit greater flexibility in farming operations. This greater flexibility is essential on account of the shortage of some farm seeds and the damage to hay and pasture seedings caused by drought. Such steps are intended to offset the temporary effects of drought and do not indicate abandonment of the policy of bringing about an eventual shift to a more extensive type of farming, involving a greater use of land for grass and for soil-building and erosion-preventing crops.

In providing adjustment payments, the 1935 program again offers what is in effect a kind of insurance against crop loss and disease. This feature was of great value in 1934 after the drought, particularly in the western Corn Belt. Because it is based on past average production instead of current production, the rate of the adjustment payments is not affected by adverse weather, diseases, or other factors that may reduce yields during the contract year.

PAYMENTS UNDER CONTRACT

The first installment of the 1935 adjustment payments, consisting of 15 cents per bushel in the case of corn and \$7.50 per head in the case of hogs, will be made as soon as practicable after the contracts are accepted by the Secretary of Agriculture. The remainder, less the producers' pro rata share of the local administrative expenses, will be due on or about January 1, 1936.

As an integral part of the new corn-hog program, efforts are being made to formulate a Government corn-loan program for 1935, with loans available only to producers and landlords in surplus-producing areas who have signed the 1935 corn-hog contract. In view of this requirement, it is obvious that the feasibility of such a loan would depend largely on the success of the new corn-hog program, and to some extent also on the size of the crop in prospect. Determination of these factors and the exact conditions of the proposed loan therefore cannot be made until some time shortly before the harvesting of the 1935 crop. Such a loan would aid contracting producers in the surplus areas financially, and it would be another factor tending to steady prices and production at a level calculated to benefit all.

Administrative rulings for 1935 carry a definition of a bona fide farm operator which specifically eliminates from participation those persons who have virtually ceased corn or hog production.

In 1935, as in 1934, producers with a certain low base average in corn or in hog production will not be required to make adjustments. The Administration is continuing the ruling that, though he may do so if he chooses, the contract signer is not required to adjust corn acreage and will not receive a corn-adjustment payment if the average number of acres planted to corn on the land included in a contract was less than 10 acres in 1932-33, exclusive of the acres in corn used for silage or cut green. Similarly, if the hog base to be included in the 1935 contract is 15 hogs or less, the producer and the stock-share landlord, if any, may elect to produce for market in 1935 a number of hogs not to exceed the hog base. In such a case, no hog payment will be made.

PROVIDING FOR NEW PRODUCERS

For some time, determination of a hog allotment for a new producer, who has begun farming since 1933, has been a major problem. Granting even a moderate allotment to a new producer would not represent any direct adjustment from base hog production, except where a base was transferred from a retiring producer. On the other hand, it has been recognized that new producers logically should be allowed to participate in the corn-hog enterprise on some basis reasonably comparable with that set for old producers.

In 1934 the problem of the new producer was met largely by permitting transfers of hog bases from retiring producers to new producers within the same county, while providing that the new producer should receive only a corn-adjustment payment. Under certain circumstances, the new producer was allowed a production of two litters during the year, even if a transfer could not be made. In cases where hog production had been started in 1933, the producer was permitted to count his production of hogs for market from 1933 litters as his base for adjustment.

In 1935 the producer who in 1934 acquired a hog base by transfer from a retiring producer may retain this base to complete his permitted production. As in 1934, he will receive no hog payment. If he desires, however, he may, at the discretion of the county allotment committee, and subject to approval by the administration, abandon the transferred base and produce for market a number of hogs reasonably proportionate to the average corn production on the farm. This is in accordance with administrative ruling. In this case, however, no hog-benefit payment will be made.

Contract applicants who began farming in 1934 but who did not sign a contract, or applicants who will begin farming in 1935 may also take advantage of the new ruling which permits producing for market a number of hogs reasonably proportionate to the corn production on the farm. In this case also no hog-benefit payment will be made.

GREATER SIMPLICITY IN 1935 PROGRAM

Insofar as possible, the number of rulings made in connection with the 1935 corn-hog contract has been kept to a minimum. The dropping of restrictions on contracted acres removes the necessity for considerable regulation by administrative order. All rulings pertaining to the same subject have been consolidated and rephrased for greater simplicity and clarity.

In developing the procedure for conducting the 1935 corn-hog program, special attention was given to ways and means of insuring the most rapid handling of contracts possible. To this end, the program machinery has been modified and revised to provide in 1935:

1. Use of an application form instead of the contract itself in the initial sign-up.
2. Classification of applicants to expedite filling out of contract forms in the county office.
3. More specific instructions to committeemen and a flow chart showing every step in the program procedure and the responsibilities of each administrative unit, both as to function and as to forms handled.

In the case of 1934 signers whose status has not changed, the production data required for the 1935 contract will be transferred from the old contract. In this way, the committeemen may considerably expedite the handling of the bulk of the 1935 forms.

The contract form for 1935 has also been considerably simplified.

FARMER CONTROL CONTINUED

The new program, like the old, will be carried out largely by farmers themselves through their county committees and county control associations. The community committee and county association set-up for 1934 is being continued without material change. It permits really democratic control of the adjustment work and gives every contract signer a part in the association affairs.

State corn-hog committees, State boards of review, and the extension service again will assist with the program for the States. The extension service and the State corn-hog committees, with the assistance of the county agricultural agents, will supervise the educational meetings and the signing of applications. The State corn-hog committees, in States having such committees, and the State extension directors in other States, will function continuously in an advisory capacity and as liaison units between the administration and the local committees. The State boards of review, each consisting of three or more members appointed by the corn-hog section of the administration, again will supervise the adjustment of corn and hog data, and in addition will check contract applications and make a preliminary audit of contracts.

As in 1934, local administrative expenses will be determined by the county control association officers and will be deducted from corn and hog payments.

CONTRACT BASED UPON OUTLOOK FOR FUTURE

In 1935, corn-hog farmers of the United States will meet their first real test of voluntary crop control. They will be deciding whether to sign a contract that is based upon the outlook for the future rather than on conditions at the moment. At sign-up time a year ago, a crop surplus was at hand and prices were low; the need for production control was obvious. This year, prices will be relatively high at the time of the sign-up, and the surpluses will have disappeared; excess production will be potential and not actual.

CHAPTER 6

DAIRY PRODUCTS

SALIENT FACTS ABOUT DAIRY ADJUSTMENT

1. Number of milk licenses in effect Dec. 31, 1934.....	48
2. Percentage of nonfarm fluid milk consumption handled in markets under Federal license.....percent..	25
3. Percentage dairy products price index was of parity:	
In December, 1933.....do.....	75
In December, 1934.....do.....	85
4. Butter and cheese purchases and commitments under surplus-removal programs up to Jan. 1, 1935:	
Butter.....pounds	67, 748, 225
Cheese.....do.....	17, 803, 224
5. Cattle tested in 1934 under emergency Federal-State disease-eradication program:	
Number tested for bovine tuberculosis (June to December inclusive).....head..	5, 841, 407
Number of reactors in tuberculosis test.....do.....	176, 197
Number tested for Bang's disease.....do.....	994, 069
Number of reactors in Bang's disease test.....do.....	134, 388
Maximum paid to owners for eliminating grade animals	
per head..	\$20
Maximum paid to owners for eliminating purebred animals	
per head..	\$50

At the passage of the Agricultural Adjustment Act, the dairy industry faced a situation in which the predominant factors included an unusually large number of milk cows on farms in the United States, a lowered rate of milk production per cow, and sharply reduced prices for dairy products.

The characteristics of the dairy industry in different regions invite different problems. The North Atlantic area is primarily a fluid milk producing section, with the exception of New York and parts of Pennsylvania, where some manufactured dairy products are produced. The north central regions are in the heart of the butter territory, although much cheese and condensed or evaporated milk and some fluid milk are produced. The south central and southern regions have developed dairying close to metropolitan centers first and then there has been a gradual growth of the manufactured milk industry in recent years, with the rise of cheese factories and evaporating plants. The far west and Pacific slope regions are largely self-contained areas with their production of manufactured dairy products in balance with demand, and with highly developed, intensively managed dairy farms serving the larger cities.

I. HISTORICAL SURVEY OF DAIRY INDUSTRY, 1900-1935

Since 1900 there had been an upward trend in the number of dairy cows and heifers 2 years old and over on farms in the United States. The number of animals increased from 15,253,000 in 1900 to 26,062,000 on January 1, 1934. From January 1, 1928, to January 1, 1934, the increase was 18 percent. (See table 26.)

TABLE 26.—*Number of milk cows 2 years old and over on farms in United States on Jan. 1, 1900-34, and percentage changes from previous year*

Year	Number	Percent change from previous year	Year	Number	Percent change from previous year
	<i>Thou- sands</i>	<i>Percent</i>		<i>Thou- sands</i>	<i>Percent</i>
1900.....	15,253		1918.....	21,021	+2.3
1901.....	15,521	+1.8	1919.....	21,219	+ .9
1902.....	15,787	+1.7	1920.....	21,455	+1.1
1903.....	16,073	+1.8	1921.....	21,440	- .1
1904.....	16,459	+2.4	1922.....	21,822	+1.8
1905.....	16,842	+2.3	1923.....	22,099	+1.3
1906.....	17,277	+2.6	1924.....	22,288	+ .9
1907.....	17,650	+2.2	1925.....	22,505	+1.0
1908.....	17,937	+1.6	1926.....	22,311	- .9
1909.....	18,154	+1.2	1927.....	22,159	- .7
1910.....	18,206	+ .3	1928.....	22,129	- .1
1911.....	18,244	+ .2	1929.....	22,330	+ .9
1912.....	18,312	+ .4	1930.....	22,910	+2.6
1913.....	18,526	+1.2	1931.....	23,576	+2.9
1914.....	18,930	+2.2	1932.....	24,475	+3.8
1915.....	19,526	+3.1	1933.....	25,277	+3.3
1916.....	20,064	+2.8	1934.....	26,062	+3.1
1917.....	20,541	+2.4			

The increase in milk-cow numbers was not uniform throughout the United States. In the North Atlantic States hardly any increase occurred after 1900, while in the west north central, east north central, and south central areas the increases from 1900 to 1934 were 96.2 percent, 71.2 percent, and 98.2 percent, respectively. From 1929 to 1934 the number of dairy cows increased 19.7 percent, 16 percent, and 22.9 percent in the west north central, east north central, and south central areas, respectively.

In recent years, average milk production per cow has been declining and total milk production has not kept pace with the sharp increase in the number of cows. In 1929 average milk production per cow was 4,582 pounds. This average steadily declined to 4,178 pounds in 1933. Poor pastures resulting from drought conditions in some major milk-producing areas, and some decrease in the amount of grain fed to milk cows, have contributed to the decrease in average milk production per dairy animal since 1929.

BUTTER MANUFACTURE

Before 1918 more butter was made on farms than in creameries in the United States. Since then the volume of creamery-butter production has been increasingly greater than farm-butter production. In 1933 farm-butter production totaled about 549,535,000 pounds, while creamery-butter production totaled 1,762,688,000 pounds.

While the shift from farm production of butter to creamery production was taking place, interregional shifts in the production of dairy products took place. Creamery-butter production in New England declined from 21,087,000 pounds in 1921 to only 3,889,000 pounds in 1933 and in the Middle Atlantic area from 39,717,000 pounds in 1921 to 27,295,000 pounds in 1933. In these areas there was a shift from the production of milk for manufactured dairy products to the production of milk for use in fluid form.

There also have been marked increases in the production of cheese and evaporated milk in the United States. The volume of milk used in the principal manufactured dairy products increased by about 63 percent from 28,414,000,000 pounds in 1921 to 46,236,000,000 pounds in 1933.

TRENDS OF PRICES

After the close of the World War, prices of dairy products were relatively more favorable than prices of other agricultural commodities. This situation had the effect of causing farmers to shift from production of other farm goods to dairying. In addition, the prices of feed grains in relation to butter were rather low during most of the period, and this tended to cause established dairymen to increase production.

Despite the tendency toward increased production, prices of dairy products remained relatively favorable, because of comparatively good employment conditions in the cities from 1923 to 1929 which helped maintain consumption; the protection of dairy products by tariffs; the fact that there was no exportable surplus of dairy products while other competing major farm commodities were on an export basis; and the difficulties in making an immediate shift from the production of other farm goods to dairying.

With the marked decline in consumer incomes that took place from 1929 to 1933, prices of dairy products declined sharply, from an index of 157, and reached the low point of 71 in March, 1933.

The price index of dairy products rose from 88 in December 1933 to 107 in December 1934. The price index was 75 percent of parity in December 1933 and 85 percent in December 1934.

The dairy industry, toward the end of 1934, faced an unsatisfactory ratio of feed prices to butterfat prices. This situation, together with the scarcity of feed and forage, was not expected to ease up until the pasture and grain harvest of 1935.

Adjustment measures for the dairy industry, taken under the provisions of the Agricultural Adjustment Act, have included:

- (1) Issuance of licenses for fluid-milk sales areas.
- (2) Removal of surplus dairy products and cattle.
- (3) Elimination of diseased dairy animals.
- (4) Marketing agreements for evaporated milk and dry skim milk.
- (5) Proposals for a production-control program for the industry.

II. MILK AGREEMENTS AND LICENSES

During the period from May through December of 1933, marketing agreements and licenses for milk were put into effect in 15 markets—Chicago, Detroit, Philadelphia, St. Paul-Minneapolis, Baltimore, Knoxville, Tenn., Evansville, Ind., Des Moines, New Orleans, Boston, San Diego, Calif., Oakland, Calif., St. Louis, Los Angeles, and Richmond, Va.

Some of these agreements included:

- (1) Schedules of minimum prices to be paid producers by distributors, classified according to the use distributors made of the milk.
- (2) Schedules of wholesale and retail distributors' resale prices to be charged consumers.
- (3) Provisions for paying producers on some form of the base and surplus plan.

Two major problems encountered in these agreements were establishing producers' prices at a level which did not stimulate production within the milk shed nor induce increased competition from producers outside the milk shed, and the establishment of resale prices to consumers.

In some cases the establishments of resale price appeared to "freeze" distributors' margins at questionable levels, and the Agricultural Adjustment Act does not provide a satisfactory basis for determining the point at which distributors' margins should be fixed. In some cases, distributors demanded increased margins on the ground that their costs of operation had increased because of recovery measures. Much difficulty was also encountered in making acceptable adjustments between store and delivered prices to consumers.

Difficulties in enforcing the agreements occurred almost immediately. The provision most often violated was the one dealing with resale prices. In the case of public utilities in which the Federal Government establishes prices that may be charged to consumers for commodities or services, the Government usually also establishes rates of return that may be earned on investment in plants and equipment, fixes requirements with respect to the services furnished to consumers, and regulates other phases of the operation of public utilities. The basis for a similar program for the regulation of resale milk prices is not set forth in the Agricultural Adjustment Act.

PRIMARY PURPOSE OF ACT TO INCREASE RETURNS TO PRODUCERS

The primary purpose of the Agricultural Adjustment Act is to increase returns to producers for agricultural commodities. Accordingly, early in 1934 the Adjustment Administration announced a modified policy with respect to milk markets. All milk-marketing agreements were canceled effective February 1, 1934. Many of the licenses, which had supplemented these agreements, remained in effect. Licenses carrying provisions that were in accord with the new policy were subsequently issued.

Up to December 31, 1934, licenses have been issued for the following markets: Philadelphia, Pa.; San Diego, Calif.; Phoenix, Ariz.; Chicago, Ill.; Southern Illinois sales area; Alameda County, Calif.; Baltimore, Md.; Los Angeles, Calif.; Des Moines, Iowa; Minneapolis and St. Paul, Minn.; Omaha, Nebr. and Council Bluffs, Iowa; Evansville, Ind.; Kansas City, Kans., and Kansas City, Mo. (Greater Kansas City); St. Louis, Mo. and East St. Louis, Ill. (Greater St. Louis sales area); Boston, Mass.; Richmond, Va.; Lincoln, Nebr.; Sioux City, Iowa; Wichita, Kans.; Topeka, Kans.; Leavenworth, Kans.; Indianapolis, Ind.; Providence, R. I.; Newport, R. I.; Fall River, Mass.; New Bedford, Mass.; Lexington, Ky.; Quad Cities (Davenport, Iowa, and Moline, East Moline, and Rock Island, Ill.); Louisville, Ky.; Oklahoma City, Okla.; San Francisco, Calif.; Fort Wayne, Ind.; Savannah, Ga.; Tulsa, Okla.; Fort Worth, Tex.; Denver, Colo.;

Dubuque, Iowa; Atlanta, Ga.; and the following cities in Michigan: Detroit, Ann Arbor, Battle Creek, Bay City, Flint, Grand Rapids, Kalamazoo, Lansing, Port Huron, Saginaw, and Muskegon. The Philadelphia and San Diego licenses were issued under the 1933 policy.

SCOPE OF MILK LICENSES

Approximately one-fourth of the fluid milk consumed by nonfarm population in the United States is at present handled in markets operating under Federal license.

The milk-license program is intended to raise and maintain the income of milk producers as much as possible within an open, competitive market structure. Federal licenses are designed to be the framework of a market-price structure in which competitive forces are intelligently directed to bring about efficiently operating markets, instead of markets wherein undirected competitive forces tend to cause unstabilized and chaotic conditions.

Distributor competition under these licenses is limited to that which is pointed primarily toward greater efficiency in distribution, rather than toward advantages secured through obtaining milk at prices lower than other distributors must pay. This end is sought through the classified-price plan, under which each distributor is required to pay the same price according to the use made of the milk. In the case of class I milk distributors are not permitted to bring in milk from any source at a price lower than other distributors in the market are required to pay for milk entering the same use.

MARKET POOL TENDS TO ELIMINATE VIOLENT PRICE FLUCTUATIONS

Federal licenses provide for a market pool in which the proceeds from sales of all milk, which is sold to distributors according to a classified-price plan, are apportioned among producers. That is, in markets operating under a "straight pool" with no base-surplus or other plan for prorating the market among producers, all producers receive a weighted average price based upon the total value of all milk for all uses. This tends to eliminate violent fluctuations in price, occasioned in part by producers' competing with each other on a price basis, and undertaking to undersell each other.

In markets operating under a base-surplus or other method of prorating the market among producers, each producer is given an allotment representing his proportional share of the fluid milk and cream market. This allotment or base is established upon the basis of his past deliveries to dealers.

In some markets distributors are required to pay producers the "blended" price for delivered base milk. This blended price is calculated from distributors' reports of the volume of milk sold by them in different uses; the prices of different classes of milk as defined in the license; and the price established for milk in excess of the producers' delivered base.

In other markets producers receive the class I price for delivered base milk, and a lower price for all milk they deliver in excess of their delivered bases. Under this arrangement producers who are at the same distance from market and who produce milk of the same butter-fat test, receive the same price for that proportion of their milk repre-

senting their share of the fluid milk and cream market, and the lower price for the excess portion of their milk that must be converted to manufactured uses. In this manner producers share proportionately both in the fluid milk and cream market and in the "surplus" market.

ENFORCEMENT PROBLEMS IN 1934

The enforcement of Federal milk licenses has become increasingly important in 1934. In the section of this report dealing with litigation under the Agricultural Adjustment Act and with administrative enforcement, there is set forth in detail the results of the procedure followed by the Agricultural Adjustment Administration for the enforcement of milk licenses, administratively and in the courts, during the year 1934.

The problem which has principally concerned the courts in those cases in which the enforcement of milk licenses was sought in injunction proceedings has been the question of the power of the Federal Government to regulate the marketing and distribution of milk in the exercise of its constitutional power to regulate interstate commerce.

The Federal power to license the distribution of milk in the local sales areas of the country may ultimately be held by the courts to depend upon the facts with respect to interstate commerce in milk in each particular area.

The legal and constitutional question of the right of the Government to license the distribution of milk in those areas where a substantial portion of the milk consumed is produced in States other than the State of its sale must be sharply distinguished from the question which is presented in those markets where all of the fluid milk consumed is produced locally.

The theory of the Government and the attitude of the lower Federal courts, as expressed in the decisions heretofore rendered, have demonstrated the differences between these two situations.

In the former case the Government has argued that it has a clear right to regulate the distribution of milk originating outside of the State and that in order to effectuate such regulation, it is necessary likewise to regulate the distribution of milk which is locally produced.

In the latter case it has been the theory of the Government that the price received by producers for fluid milk is so interrelated with the price of manufactured dairy products which move in interstate commerce that the Federal Government has the power to regulate the former in order to remove burdens and obstructions upon interstate commerce in dairy products.

At the present time, no Circuit Court of Appeals has passed upon the question of the power of the Federal Government to regulate the distribution of milk in either of these two situations. Until such time as the Supreme Court of the United States renders a definitive decision upon these questions no certain prediction can be made as to what will be ultimately declared to be the scope of the Federal power to regulate the distribution of milk.

PRICES TO PRODUCERS

Without restriction of supplies, it is practically impossible to maintain prices to producers at a level higher than that based on a normal relationship to manufacturing-milk prices, without stimulating an

increase in the supply of milk on the market, from either within or without the usual limits of the milk shed. Therefore, the prices established in milk licenses are subject to revision as required by changing supply and demand conditions in the market.

During last summer, drought conditions severely affected the supply of milk in many markets. In order to enable farmers to purchase feed, the price of which was rising markedly, prices of milk were raised in some markets as much as was necessary to assure a supply of milk sufficient to meet market needs. In some cases, after drought conditions became less acute, supplies of milk entering the market increased in response to the higher schedule of prices, and it was necessary to reduce the price in order to keep excessive supplies from breaking down the entire market-price structure.

PRODUCER-DISTRIBUTOR BROUGHT INTO PROGRAM

The producer-distributor problem has been difficult. It is necessary to bring the producer-distributor within the scope of the program if supplies are to be effectively restricted so as to enhance prices.

However, under a program that aims to increase prices and incomes as much as possible within the limits of a competitive market structure, the immediate problem is to determine the relationship of the producer-distributor to the nondistributing producers, and to determine how much of the burden of surplus the producer-distributor should carry.

Under most of the licenses now in effect, the producer-distributor is exempt from payments to the adjustment account on his own production. However, any purchases he makes from other producers are accounted for by prorating them in accordance with the several uses for which he sells milk, while bulk sales made to other distributors must be accounted for as class III milk.

APPORTIONING THE MARKET AMONG PRODUCERS

The base-rating plan, designed to induce a more even volume of production throughout the year, has been in operation in several markets for a number of years. In most cases it has been an important factor in decreasing seasonal variation in milk production and bringing production into closer conformity with the sales of fluid milk and cream.

Generally speaking, the base-rating system involves the establishment of individual producers' bases. These bases represent the volume of milk for which the individual producer will be paid the fluid-milk price, the cream price, or a blend of the two prices. For all milk delivered in excess of his base the producer receives a price based on the value of this milk for manufacturing purposes.

In some cases the only well-defined means of determining these bases has been for each producer to share equally in the fluid milk market, or cream market, or both, and to bear an equal share in the surplus burden. That is, the percentage of his total production for which there is paid the fluid-milk price, or the cream price, or a blend of the two, is the same for each producer. However, in some cases there has been no particular effort to rank producers according to their ability to supply a relatively constant flow of milk suitable for distribution as fluid milk and cream throughout the year. This is

necessary in order to compensate producers who are efficient in this respect.

ADMINISTRATION OF LICENSES

It is highly desirable that administration of milk licenses be decentralized as much as possible and that the responsibility for this administration be placed largely in the hands of some local body. However, the emergency that existed at the time the licensing program was inaugurated made necessary provisions in the Federal milk licenses which set forth the duties of market administrators who are charged with the administration of the license.

Cooperative associations are often equipped to perform or already are performing some particular services to members which the Agricultural Adjustment Administration is not in a position to render. Such associations sometimes guarantee producers a steady market for their milk under terms and conditions named by them and they usually set up reserve funds to protect producers from financial loss through failure of distributors to pay for milk.

The checking of tests and weights from records of distributors' accounts and the distribution of adequate market information are services which the Adjustment Administration license officials are well able to perform for nonmembers of cooperative associations.

It is highly desirable that a constructive working relationship between the Federal Government and the cooperative associations should be maintained at all times.

STATE-FEDERAL MILK CONTROL

Since State authority has become an increasingly important factor in the regulation of milk marketing, the working relations between the Agricultural Adjustment Administration and the various State milk-control agencies have likewise become more important. Pressure for State regulation of milk marketing is responsible for the fact that 18 States now have more or less clearly defined prices and conditions of milk marketing.

In their attempts to deal with critical situations the States have met with certain legal and economic problems somewhat parallel to those in the same field that the Adjustment Administration has faced in its own work on licensed markets.

It has been suggested that groups of States might act together, with the aid of the Federal Government. Because the Federal authorities have gained experience in problems of regulating interstate milk traffic, opinion seems to favor concurrent exercise of power by State and Federal Governments, where public interest demands such action.

Representatives of cooperative milk producers' associations consequently have recently taken steps to secure the enactment of protective milk legislation in States without such laws, and the amendment of existing State milk-control laws that require to be strengthened. A reasonable degree of uniformity and coordination in the relation of the States with each other and with the Federal Government is the objective.

PROPOSALS FOR STATE MILK LAWS

It is proposed, for one thing, to enact in State milk laws compact clauses investing the respective State with powers and duties to confer with authorities of other States and of the Federal Government, particularly in the conduct of joint hearings and the issuance of joint or concurrent orders. It is held that enforcement and compliance will be more easily obtained through such joint action.

Except in the establishment of resale prices and the use of market administrators, the general milk-control programs of the States and that of the Federal Government are similar. The States usually establish resale prices to consumers, while the Federal Government does not, except for low minimum prices on a few markets. Under the Federal licenses milk-market administrators, appointed by the Secretary of Agriculture, supervise the licenses. This plan is not used in State milk regulation. Classified prices as the basis of payment for milk and equalization of the position of all producers and all distributors in a particular market are features of most Federal milk licenses that may or may not appear in State regulations.

Both State and Federal Governments seek to improve the price structure for the producer, and in so doing they attempt to discourage unfair trade practices. Practically all States with milk-control laws declare it contrary to public policy for milk dealers to reject milk without reasonable cause; to fail to pay for milk according to its actual use; or to take actions that tend to demoralize the dairy price structure, and often to harm consumers.

The Adjustment Administration's position has been that it cannot go beyond its own field and recommend State milk legislation. The States, however, in shaping and enforcing such laws, can make it practical for the Federal Government to put a license program into operation, if such is requested, and thereafter to function with the greatest possible effect in behalf of producers and other interested groups.

III. SURPLUS-REMOVAL ACTIVITIES

During the summer of 1933, prices and production conditions for manufactured dairy products, especially butter, reached a serious situation. Production had increased by 4 percent and consumption had declined, with resulting accumulation of excessive storage stocks. These stocks on September 1 were 175,476,000 pounds as compared to 107,259,000 pounds on September 1, 1932, and 147,076,000 pounds as the September 1 average for the 5 years 1925-29. It appeared that in order to avoid a drastic decline in butter prices the removal of a considerable volume of butter from regular marketing channels would be necessary.

Leaders of the dairy industry appealed to the Secretary of Agriculture for an immediate surplus-removal program and pledged their support to a general production-adjustment program to be formulated and put into effect later, since it was recognized that surplus removal activities alone would not constitute a permanent solution of the dairy problem.

Accordingly, a surplus-removal program was put into effect in August 1933. In anticipation that a processing tax would be levied on dairy products and would finance the surplus-removal activities, the United States Treasury advanced a total of \$11,250,000 for the purchase of butter.

Butter purchased with the funds advanced by the Treasury under this program, up to March 28, 1934, totaled 45,772,265 pounds. An additional 5,800,000 pounds were purchased by the Federal Emergency Relief Administration with its funds. The total amounts of butter purchased and distributed through these channels, including the purchases by the Federal Emergency Relief Administration, are shown in table 27.

TABLE 27.—*Government purchases and distribution of butter, August 1933 to June 1934*¹

Month	Pounds purchased	Pounds distributed	Month	Pounds purchased	Pounds distributed
August.....	1,505,092	0	March.....	1,730,623	4,690,834
September.....	3,015,622	0	April.....	2,072,000	2,405,998
October.....	8,860,931	0	May.....	0	648,840
November.....	17,369,882	0	June.....	0	171,355
December.....	12,480,298	3,300,000	Total.....	51,572,265	51,572,265
January.....	3,437,817	22,466,293			
February.....	1,100,000	17,888,945			

¹ Includes 5,800,000 pounds purchased by the Federal Emergency Relief Administration.

Between January 2 and April 24, 1934, a total of 6,346,265 pounds of cheese for distribution through relief channels was purchased through the Federal Surplus Relief Corporation with the funds advanced by the Treasury.

ADDITIONAL PURCHASES FROM JONES-CONNALLY FUNDS

The Jones-Connally Cattle Act, passed by the Seventy-third Congress and approved April 7, 1934, authorized the appropriation of 200 million dollars to enable the Secretary of Agriculture to finance surplus reduction and production adjustments in the dairy and beef-cattle industries, and to support and balance the markets for these industries. Not more than 60 percent of the authorization could be used for either of these industries. Of the amount authorized, 100 million dollars was appropriated.

The La Follette amendment to this act authorized the appropriation of an additional 50 million dollars to enable the Secretary to make advances to the Federal Surplus Relief Corporation for the purchase of dairy and beef products for relief distribution, and for elimination of diseased dairy and beef cattle. The full amount of this authorization was appropriated.

With the funds appropriated under this act, as amended, purchases of butter and cheese were begun July 2, 1934. By December 8, 1934, a total of 10,135,960 pounds of butter and 367,007 pounds of cheese had been purchased, with an additional 6,040,000 pounds of butter and 11,189,952 pounds of cheese to be delivered on contract as of that date.

Up to the end of 1934, purchases and commitment for purchase under the surplus-removal program included 67,748,225 pounds of butter and 17,803,224 pounds of cheese. This included purchases and commitments from Treasury advances made in anticipation of processing taxes on dairy products, from funds provided under the Jones-Connally Act, and from Federal Emergency Relief Administration funds. At the close of the year no processing tax had been levied on dairy products.

A DROUGHT RELIEF MEASURE

Governmental purchases of cattle which, because of the drought-caused feed shortage, would have been lost to their owners, was carried on in part with funds appropriated under the Jones-Connally Act. This emergency operation was designed to conserve supplies of human food and at the same time to bring feed requirements for livestock, and the available supplies of feed, into better balance.

It operated at the same time as a surplus-removal measure. Because of the nature of the plan, it resulted in cattle owners selling to the Government, as a rule, the lower-producing animals from their dairy herds.

The potential producing capacity of the Nation's dairy industry probably remains at a relatively high level which, with good feed-growing conditions in 1935, may result in a total milk production not much below the level of recent years.

IV. ELIMINATION OF DISEASED CATTLE

The La Follette amendment to the Jones-Connally Act, to which previous reference has been made, authorized the appropriation of funds to enable the Secretary of Agriculture to eliminate diseased beef and dairy cattle, including those infected with bovine tuberculosis or with Bang's disease (contagious abortion), and to make payments to owners indemnifying them for the elimination of such animals.

A program for this work was initiated in the summer of 1934, administered by the Bureau of Animal Industry in cooperation with State agencies, using funds allocated by the Agricultural Adjustment Administration. It provides for testing herds, eliminating diseased animals, and making payments to owners, and is to continue through the calendar year 1935.

BOVINE TUBERCULOSIS

Under the program for eliminating cattle infected with tuberculosis, put into effect June 12, 1934, the owner receives a maximum of \$20 for each grade animal and \$50 for each purebred animal eliminated. These sums include any amounts that may be received from State sources and any returns from the sale of the animal for slaughter. The program supplements the Federal-State work which has been in progress for a number of years, and follows the same procedure.

Under the emergency Federal-State plan, 528,025 herds including 5,841,407 cattle were tested from July to December, inclusive. The rate of expansion of the program through the emergency fund is indicated by the fact that 980,917 cattle were tested in October 1934, as compared with 318,835 in July.

During this 6-month period, 176,197 cattle showed a positive reaction to the tuberculin test. (See table 28.) This represents 3 percent of the cattle tested. Only those herds which had not previously been tested were included in the program.

Since tuberculosis work has been linked up with that being carried on in the States under regularly established testing, there has been some variation in the utilization of the funds allocated by the Agricultural Adjustment Administration. In Connecticut, Minnesota, New York, and Vermont a considerable number of the tests were

made by veterinarians employed by the counties and the States. The Federal payment on reacting cattle during the 6-month period in those States was from the Jones-Connally amendment. On the other hand, other available funds were used to pay indemnity on reactors in Massachusetts, while the testing expense was paid out of the Jones-Connally fund.

TABLE 28.—*Data on tuberculin testing under emergency cattle elimination program, July 1934*

State	Herds tested	Cattle tested	Reactors	Percentage of reactors
Alabama.....	3,562	23,000	23	0.1
Arizona.....	1,168	12,793	67	.5
Arkansas.....	50,448	248,234	204	.08
California.....	5,202	118,533	26,667	22.5
Colorado.....	8,824	181,821	3,279	1.8
Connecticut.....	7,982	86,419	4,663	5.4
Florida.....	2,733	42,509	33	.08
Georgia.....	27,041	166,148	62	.04
Indiana.....	3,191	34,765	160	.5
Iowa.....	23,176	484,442	16,865	3.5
Kansas.....	22,806	283,214	1,590	.6
Louisiana.....	90	2,749	71	2.6
Massachusetts.....	1,320	7,427	2,013	27.1
Minnesota.....	41,189	830,479	3,148	.4
Mississippi.....	13,562	77,087	43	.06
Missouri.....	82,666	557,869	552	.1
Montana.....	1,137	27,718	46	.2
Nebraska.....	4,283	69,924	567	.8
New Mexico.....	800	8,606	29	.3
New York.....	68,743	968,341	106,017	10.0
Ohio.....	19,556	145,046	566	.4
Oklahoma.....	41,028	476,895	1,369	.3
Pennsylvania.....	11,060	104,817	2,766	2.6
South Carolina.....	4,578	15,588	1	.01
South Dakota.....	2,422	37,621	1,074	2.9
Tennessee.....	19,229	75,324	113	.2
Texas.....	27,863	233,688	68	.03
Vermont.....	9,185	154,512	2,508	1.6
Virginia.....	8,775	31,760	87	.3
Wisconsin.....	13,338	275,292	1,383	.5
Wyoming.....	1,068	58,786	163	.3
Total.....	528,025	5,841,407	176,197	3.0

BANG'S DISEASE

On July 19, 1934, the elimination program was broadened to include cattle infected with Bang's disease. It constitutes the first Nation-wide measure toward eradication of this disease.

Under this program the cattle owner enters into a voluntary agreement with the Secretary of Agriculture to market for slaughter, under Federal or State supervision, all cows, bulls, and heifers over 6 months of age, that react positively to the agglutination blood test; to confine additions to his herd, so far as possible, to virgin animals and those from herds known to be free from Bang's disease; to clean and disinfect his premises under supervision after the removal of the reactors; and to continue blood-testing the animals in his herd in accordance with any accredited Bang's disease elimination program that may have been adopted by his State.

The Secretary of Agriculture agrees that the herd shall be tested for Bang's disease under the direction of the Bureau of Animal Industry, without expense to the owner except for the necessary handling of the animals incident to collecting blood samples. He also agrees to indemnify the owner for each animal eliminated, in an amount equal to its appraised valuation within a maximum limit, less any net proceeds from marketing the animal and also less any other

indemnities that may be received from local government units. The maximum appraised valuation for each grade animal is \$20 and for each registered purebred animal, \$50.

Cattle owners in 46 States have joined in the program. From July to December 1934, inclusive, 51,136 herds, including 944,069 animals, were tested, and 134,388 showed a positive reaction to the test. (See table 29.)

TABLE 29.—*Bang's disease testing July–December 1934, under the emergency diseased-cattle elimination program*

State	Herds tested	Cattle tested	Reactors positive	Percentage of reactors
Alabama.....	130	7,635	1,309	17.1
Arizona.....	16	592	133	22.5
Arkansas.....	519	8,270	1,280	15.5
Colorado.....	5	399	67	16.8
Connecticut.....	48	2,021	325	16.1
Delaware.....	148	3,765	490	13.0
Florida.....	184	5,782	661	11.4
Georgia.....	64	3,895	425	10.9
Idaho.....	548	8,297	494	6.0
Illinois.....	254	6,915	1,653	23.9
Indiana.....	1,367	21,154	3,206	15.2
Iowa.....	1,156	25,886	4,342	16.8
Kansas.....	179	9,724	1,505	15.5
Kentucky.....	1,715	26,184	3,067	11.7
Louisiana.....	19	1,220	208	17.0
Maine.....	27	626	114	18.2
Maryland.....	360	7,518	1,289	17.1
Massachusetts.....	19	861	171	19.9
Michigan.....	1,659	27,642	4,810	17.4
Minnesota.....	8,153	140,554	17,734	12.6
Mississippi.....	144	5,935	1,351	22.8
Missouri.....	361	8,948	895	10.0
Montana.....	275	10,558	1,952	18.5
Nebraska.....	70	2,894	417	14.4
Nevada.....	273	6,934	824	11.9
New Hampshire.....	92	2,453	377	15.4
New Jersey.....	70	6,064	495	8.2
New Mexico.....	51	1,997	327	16.4
New York.....	198	5,928	1,052	17.7
North Carolina.....	583	15,944	1,778	11.2
North Dakota.....	359	7,655	835	10.9
Ohio.....	6,054	80,688	13,153	16.3
Oklahoma.....	2,477	49,444	7,085	14.3
Oregon.....	1,855	23,205	2,238	9.6
Pennsylvania.....	1,099	22,488	2,998	13.3
Rhode Island.....	6	345	43	12.5
South Carolina.....	64	3,712	485	13.1
South Dakota.....	8	234	47	20.1
Tennessee.....	312	9,729	1,953	20.1
Texas.....	277	19,075	3,463	18.2
Utah.....	954	11,544	1,159	10.0
Vermont.....	99	3,660	897	24.5
Virginia.....	3,138	55,506	5,199	9.4
Washington.....	2,752	39,754	4,976	12.5
West Virginia.....	1,909	20,812	1,624	7.8
Wisconsin.....	11,086	219,623	35,482	16.2
Total.....	51,136	944,069	134,388	14.2

Of the total number of cattle tested, more than 14 percent showed infection with Bang's disease. In no State included in the program was the rate of infection less than 6 percent. In 9 States it was between 6 percent and 10 percent. Six States showed percentages of between 20 percent and 24.5 percent of infected cattle.

V. MARKETING AGREEMENT FOR EVAPORATED AND DRY SKIM MILK

EVAPORATED MILK AGREEMENT

Rapidly increasing deliveries at milk-evaporating plants, increasing stocks in the hands of manufacturers, and some wasteful and unfair trade practices were the immediate causes for the adoption of a marketing agreement for the evaporated milk industry in 1933.

A series of conferences between producers and distributors culminated early in a request for a marketing agreement. After hearings in Washington, such an agreement became effective on September 9, 1933. It carried no provision for a license, but did contain provisions for: (1) Maximum and minimum wholesale prices on case goods; (2) a farm price based on a combination of butter and cheese prices in relation to the butterfat content of milk bought; and (3) a committee of producers to confer with manufacturers on any proposed change in the price formula.

The cooperation of the industry in making the agreement effective was facilitated by the fact that there are only 41 manufacturers of evaporated milk in the United States, operating about 160 plants in 27 States. This permits immediate and united action.

The primary objective of the Agricultural Adjustment Act is to increase returns to producers, and the evaporated milk agreement has functioned as a means toward that end.

EFFECT ON PRICES

During the first 6 months of 1933 the United States average price to farmers for milk of 3.5 percent butterfat content used at milk evaporating plants was 89 cents per 100 pounds, although in April of that year the average was only 81 cents. In the last half of 1933, during which period the marketing agreement went into effect, the average farm price for the country as a whole was \$1.07 per 100 pounds. From January 1934 to October 1934 it averaged \$1.10 per 100 pounds.

While this improvement in prices to producers was taking place, both wholesale and retail prices of evaporated milk held fairly constant. The average wholesale selling price per case at distributing points throughout the country, for the first 6 months of 1933, was \$2.35 and the national average retail price per can was 6.3 cents. In the last half of the same year, after the marketing agreement was established, the wholesale price averaged \$2.55 per case and the retail price 6.8 cents per can. From January 1934 to October 1934 both wholesale and retail prices averaged the same as they had done in the last half of 1933.

AGREEMENT FOR DRY SKIM MILK INDUSTRY

Before a marketing agreement for the dry skim milk industry was proposed by the American Dry Skim Milk Institute, conditions in that industry were much the same as those in the evaporated milk industry.

Testimony at public hearings on the proposed agreement indicated that if the agreement were put into effect it would result in elimination

of price-demoralizing trade practices prevalent in the industry; strengthening of wholesale prices; and establishment of greater stability in the producers' price structure. Accordingly, the agreement was put into effect on September 16, 1933.

Under its terms each manufacturer agrees to file with the Secretary of Agriculture and with the managing agent appointed under the agreement, a list of his selling prices stating the sizes, quantities, brands, grades, and territories to which the respective prices are applicable. This price list may be modified at any time, but such modification is subject to the disapproval of the Secretary. The manufacturer agrees to sell only at these prices, and to sell to all persons without special discounts or concessions, though the price provisions do not apply to sales of dry skim milk made by one manufacturer to another. The price list must include a base period for a carload quantity, single delivery, and prices for quantities other than this are calculated according to a prescribed schedule of differentials which is specified in the agreement and is uniform for all manufacturers.

Each manufacturer further agrees to report to the managing agent his production, purchases, sales, and stocks of dry skim milk.

Dry skim milk prices strengthened under the operation of the agreement. The United States average wholesale price was 3.85 cents per pound in February 1933, and for the first 6 months of that year averaged 4.13 cents a pound. In the last half of 1933, during which period the agreement was put into effect, this price strengthened considerably, bringing the average for the year up to 5.13 cents a pound. From January to October 1934, inclusive, the wholesale prices for the country as a whole averaged 5.39 cents a pound.

PROGRAM FOR MANUFACTURED MILK NECESSARILY LIMITED

Efforts of the Agricultural Adjustment Administration thus far have been primarily concerned with fluid-milk markets, and no direct programs for the improvement of the national price structure or the marketing systems for butter and cheese producers have been undertaken.

The surplus-removal program, however, had a broad effect on the butter-storage situation and thereby caused prices for butterfat to be firmer than otherwise they would have been during the critical period of 1933. Negotiations for butter and cheese marketing agreements were under way in 1933, but the wide-spread production of these commodities and the inherent difficulty of entering into marketing agreements with so many units of producers, independent buyers, and processors on any satisfactory common ground made the project extremely difficult.

The same problems encountered in framing a general production adjustment for the whole dairy industry were met in seeking to effectuate agreements or licenses or both for stabilizing the butter and cheese industries.

VI. PROPOSALS FOR PRODUCTION-CONTROL MEASURES

At a time when dairy production was continuing at a volume beyond market requirements, and with employment still at low levels, it appeared that surplus-removal measures and marketing agreements could not completely and effectively raise producers' price levels without some form of production adjustment. Accordingly, various proposals, many of them made by members of the industry themselves, were studied by the Adjustment Administration in an effort to formulate some program that would be acceptable to dairymen throughout the country.

Development of such a program was exceedingly difficult because of regional differences and variations in type of products, and because some areas are deficit areas while others are surplus producing. The large number of farmers concerned, estimated at more than four and a half million, and the lack of adequate statistical information for establishing production allotments, added to the difficulties.

Out of the numerous suggestions that were made and considered, a suggested program was evolved and presented for the consideration of the industry in April 1934.

At the time the program was submitted to the industry, it seemed likely that a marked increase in dairy production would take place during the following season. Milk production in recent years had not kept pace with the increase in the number of dairy cows, but it appeared that with favorable growing conditions for feed crops in 1934, an unprecedented volume of milk production was to be expected.

REDUCTION OF 20 TO 30 PERCENT PROPOSED

Under the suggested program, dairymen would have signed contracts to reduce their sales from 20 to 30 percent below the level attained in 1932-33, and would have received benefit payments of approximately 40 cents per pound of butterfat reduced below the base sales level. The program was to have been financed through the levy of a processing tax of 5 cents per pound on butterfat sales in all forms, and a compensating tax on oleomargarine.

Supplementary features of the program provided for expending 5 million dollars for milk to be distributed through relief channels; 5 million dollars for eliminating cattle affected with bovine tuberculosis; and 5 million dollars for placing milk cows upon farms that are without milk cows, principally in the Southern States, the milk from such cows to be used on the farms and in no case to be sold in regular marketing channels.

This program was presented to farmers in a series of 15 regional meetings held in Syracuse, N. Y.; Boston, Mass.; Philadelphia, Pa.; Atlanta, Ga.; Indianapolis, Ind.; Madison, Wis.; St. Paul, Minn.; Kansas City, Mo.; Salt Lake City, Utah; Des Moines, Iowa.; Fort Worth, Tex.; Memphis, Tenn.; Portland, Oreg.; Berkeley, Calif.; and Denver, Colo.

Farmers were about equally divided in numbers between those in favor and those opposed to all or parts of the program. In general they agreed that something should be done to improve the economic status of the dairymen, but were not united on any particular program. Since the success of any production-adjustment program depends

upon the cooperation of a large majority of the producers of the commodity in question, it appeared inadvisable to put the proposed dairy program in effect at once. Accordingly, it was held in obedience until producers' sentiment could become crystallized and they would be willing to give their full cooperation. This decision was consistent with the policy that no program was to be put into effect unless a substantial majority of the producers desired it and indicated a willingness to cooperate.

WAY STILL OPEN FOR DAIRY PROGRAM

Under the provisions of the Agricultural Adjustment Act, the Secretary of Agriculture is empowered to enter into production adjustment agreements or contracts with producers of milk and its products. Milk was declared one of the basic commodities when the act was drafted.

Some of the difficulties that would be met under a supply-restriction policy, if such were followed in respect to milk markets, would be (1) the establishment of prices at such a high level that evasion of the market-restrictive measures would be encouraged, (2) the danger of leaving the market in an unstable situation if and when Government support were discontinued, and (3) the general difficulty of setting up an acceptable control plan.

It is quite possible that within the coming year some degree of need for a broader national program for dairying may develop. The problem may be one of controlled expansion rather than restriction. The Agricultural Adjustment Administration does not consider the subject a closed one in the light of experiences in 1934 relative to such a contemplated program of adjustment. Complex as may be the problems which are continually baffling the best minds in the dairy industry, there should not be any relaxing of vigilance on the part of those who feel that concerted action may still be necessary for the welfare of all branches of dairying.

The present hope of the industry rests on restored purchasing power of the mass of industrial workers. If that increased demand for a reasonable amount of dairy products does not improve the position of the dairymen, there may be maladjustments remaining within the industry open to correction if the members of the industry desire to take action to that end. The Agricultural Adjustment Administration awaits the decision of the industry as to the future course in national programs.

CHAPTER 7

TOBACCO

SALIENT FACTS ABOUT TOBACCO ADJUSTMENT

1. Total number of contracts under all programs in 1934.....	289, 106
2. Total base acreage of all tobacco contract signers in 1934 acres...	1, 800, 908
3. Average percentage of reduction from base acreage under all tobacco programs in 1934.....	34
4. Increase in tobacco returns:	
Value of tobacco sales by growers for marketing year 1932-33.....	\$105, 948, 000
Total of value of sales and rental and benefit payments for marketing year 1933-34.....	\$204, 442, 000
Total of value of sales and benefit payments for marketing year 1934-35.....	\$256, 585, 000
5. Rental and benefit payments in connection with 1934-35 production.....	\$32, 688, 000
6. Kerr-Smith Act referendum:	
Percentage of acreage customarily engaged in production of Burley, flue-cured, fire-cured, and dark air-cured tobacco which was voted under referendum.....	92. 2
Percentage of voted land which was voted in favor of Kerr-Smith Act tax in 1935.....	97. 3

Tobacco growers have made substantial gains toward eliminating price-depressing surpluses and in increasing their farm income. Approximately 289,100 farmers, operating more than 90 percent of the land customarily used for tobacco production, participated in the 1934 tobacco-adjustment program. Of these, 278,700 were in the United States, and 10,400 were in Puerto Rico. Contracts in effect and the percentages of reduction in 1934 are shown in table 30.

Production in pounds of tobacco by contracting producers in 1934 was reduced approximately one-third below the average base production under the several adjustment contracts, and the total sales from the 1934 crop of all types were around 25 percent smaller than in 1933.

The acreage planted to tobacco in 1934 was the smallest in 20 years with the exception of 1 year. About one-third of the surplus of all types of tobacco in the United States was removed during the year. The total farm income received from the 1934 crop, exclusive of rental and benefit payments, was 20 percent larger than the income received from the 1933 crop, and more than twice the income received from the 1932 crop, which was about the same size as the 1934 crop. Advances in income from the various types of tobacco and the amount of benefit payments are shown in table 31.

When the 1934 tobacco-adjustment programs started, the total supply of United States tobacco in this country was 3,650,000,000 pounds. A normal supply for the level of consumption then prevailing would have been about 2,900,000,000 pounds. This gave a surplus of 750,000,000 pounds. While this surplus was accumulating,

the income of tobacco growers was being disastrously reduced. It went down from \$290,088,000 for the 1929 season to \$105,948,000 for that of 1932. It was at this low point that the Agricultural Adjustment Administration applied measures to improve the situation.

TABLE 30.—*Number of contracts, base acreage and production, and reduction from base, by tobacco programs and by States, 1934*

Kind of tobacco and State	Total contracts	Total base acreage	Total base production	Average base acreage per contract	Average reduction from base ¹
Flue-cured, types 11-14: ¹	<i>Number</i>	<i>Acres</i>	<i>1,000 lbs.</i>	<i>Acres</i>	<i>Percent</i>
Florida.....	1,038	6,023	4,534	5.80	29
Georgia.....	12,381	75,870	59,821	6.13	29
North Carolina.....	73,531	695,852	528,658	9.46	28
South Carolina.....	13,291	99,380	78,542	7.48	29
Virginia.....	11,684	94,328	59,747	8.07	26
Total flue-cured.....	111,925	971,453	731,302	8.68	28
Fire-cured, types 21-24:					
Kentucky.....	10,478	65,136	46,804	6.22	25
Tennessee.....	6,963	65,007	50,968	9.34	25
Virginia.....	6,308	28,302	20,432	4.49	25
Total fire-cured.....	23,749	158,445	118,204	6.67	25
Burley, type 31:					
Alabama.....	18	205	156	11.40	49
Arkansas.....	16	60	28	3.58	45
Indiana.....	2,995	10,110	7,645	3.37	42
Kansas.....	88	480	425	5.46	41
Kentucky.....	59,832	305,590	228,199	5.11	40
Missouri.....	1,059	7,310	7,092	6.91	40
North Carolina.....	3,969	7,310	5,950	1.84	35
Ohio.....	5,329	15,860	11,535	2.98	42
Tennessee.....	28,449	67,435	53,737	2.37	38
Virginia.....	5,793	10,720	10,144	1.85	35
West Virginia.....	1,876	5,210	3,044	2.78	45
Total Burley.....	109,424	430,290	327,955	3.93	40
Maryland, type 32.....	702	7,139	4,578	10.17	25
Dark air-cured, types 35-37:					
Kentucky.....	8,668	40,676	33,868	4.69	30
Tennessee.....	1,034	2,746	2,100	2.66	30
Virginia.....	376	1,102	819	2.93	30
Total dark air-cured.....	10,078	44,524	36,787	4.42	30
Cigar-leaf: ²					
Pennsylvania.....	4,696	31,188	(³)	6.64	67
New York.....	375	1,484	(³)	3.96	90
Ohio.....	5,067	34,906	(³)	6.89	68
Indiana.....	34	133	(³)	3.91	78
Connecticut.....	2,158	17,352	(³)	8.04	67
Massachusetts.....	1,049	7,346	(³)	7.00	70
Vermont.....	25	132	(³)	5.28	98
New Hampshire.....	27	124	(³)	4.59	92
Wisconsin.....	8,558	38,190	(³)	4.46	85
Minnesota.....	662	1,869	(³)	2.82	91
Illinois.....	12	38	(³)	3.18	80
Florida.....	122	1,994	(³)	16.34	27
Georgia.....	43	746	(³)	17.35	27
Total cigar-leaf.....	22,828	135,502	(³)	5.94	72
Puerto Rican.....	10,400	53,555	(³)	5.15	32
Total all programs.....	289,106	1,800,908	-----	6.23	34

Tobacco sections, Agricultural Adjustment Administration.

¹Tobacco contracts provide allotments of production as well as acreage, except in the case of cigar-leaf tobacco. This column shows percentages which allotted acreages were below base acreages; since some growers did not grow their full allotted acreage, the total harvested acreage of growers under contract was below the total acreage allotted. The Burley contract permitted choice of a reduction of either 33½ or 50 percent; binder and filler cigar-leaf contracts permitted choice of a reduction of 33½, 50, or 100 percent. For flue-cured tobacco, an administrative ruling permitted choice of a reduction of 20 percent in lieu of the 30 percent provided in the contract.

² Includes all domestic types of cigar-leaf tobacco except types 45 and 61.

³ Base production not established under cigar-leaf tobacco contracts.

TABLE 31.—*Value of tobacco sales by growers and benefit payments, by kind of tobacco and by marketing years, 1929-30 to 1934-35*

Marketing year	Flue-cured	Fire-cured	Burley	Maryland ¹	Dark air-cured	Cigar leaf ¹	Puerto Rican	Total
	<i>1,000 dollars</i>	<i>1,000 dollars</i>	<i>1,000 dollars</i>	<i>1,000 dollars</i>	<i>1,000 dollars</i>	<i>1,000 dollars</i>	<i>1,000 dollars</i>	<i>1,000 dollars</i>
1929-30.....	134,920	24,794	74,660	4,584	6,620	38,070	6,440	290,088
1930-31.....	103,479	14,159	55,270	6,856	4,840	29,590	9,100	223,294
1931-32.....	56,046	9,573	37,791	4,981	2,518	16,786	7,460	135,155
1932-33.....	43,158	7,769	38,909	4,212	1,634	9,496	770	105,948
1933-34:								
Value of sales.....	112,992	11,609	40,452	4,611	2,317	13,380	2,550	187,911
Benefit payments.....	9,137	485	3,442	36	162	2,079	1,190	16,531
Total.....	122,129	12,094	43,894	4,647	2,479	15,459	3,740	204,442
1934-35:								
Value of sales.....	150,504	12,678	39,560	3,570	2,854	10,486	4,245	223,897
Benefit payments.....	11,683	1,556	14,508	78	472	3,117	1,274	32,688
Total.....	162,187	14,234	54,068	3,648	3,326	13,603	5,519	256,585

Tobacco Section: Agricultural Adjustment Administration.

¹ Adjusted for accumulation and sale of farm stocks.

MARKETING AGREEMENTS SUPPORTED PRICES IN 1933

After producers had demonstrated their willingness to adjust production in 1934, domestic buyers agreed to pay higher prices for purchases from the 1933 crop. Six marketing agreements were negotiated for the principal kinds of tobacco grown in the United States. Under these agreements approximately 645,000,000 pounds of tobacco were purchased, nearly half the total 1933 production, at prices materially higher than would have otherwise prevailed.

It is estimated that the tobacco program increased the market receipts of farmers from the 1933 crop by approximately \$45,000,000. Tobacco growers received \$187,911,000 for the 1933 crop from sales on the markets. In addition, during the marketing season for the 1933 crop they received approximately \$16,500,000 in rental and benefit payments under the adjustment contracts. The grower's share of the tobacco consumer's dollar increased from 4½ percent in 1932 to 10 percent in 1933. Manufacturers' profits on the other hand declined from above 10 percent of the consumer's dollar in 1932 to about 7 percent in 1933.

An essential factor in facilitating the adjustment of tobacco production has been the flexibility of the adjustment contracts. Extreme differences in the conditions of production and in market outlets and prices and the highly specialized nature of the problems involved has necessitated separate adjustment contracts for 11 different kinds of tobacco. Furthermore, since the acreage and production of tobacco on individual farms vary widely from year to year, producers under each of the principal tobacco contracts have been given several choices as to the year or years which could be used in establishing their bases. The only exceptions to this were the 702 contracts for Maryland tobacco and the 165 contracts for Georgia-Florida shade-grown tobacco.

POUNDS AS WELL AS ACRES SPECIFIED

All tobacco contracts, except those for the filler and binder types of cigar-leaf tobacco, provide definite production allotments in pounds of tobacco as well as acreage allotments for individual farms. Allotments in pounds are specified because tobacco is an intensive crop, and yields per acre can be increased through changes in fertilizer and other cultural practices more easily than in the case of some other crops.

These specific allotments of production make it possible to determine more definitely the exact size of crop which is likely to be produced and to make adjustments in the quantity to be marketed. Under these contracts, adjustments of production allotments may be made after the crop has been planted and before selling time, on the basis of current prospects for production and demand.

Three classes of payments are made to growers who participate in the tobacco programs. The first payment for each kind of tobacco is in the form of a rental payment and is at a uniform rate per acre for each acre taken out of tobacco production, regardless of productivity. However, the rates are different for the different kinds of tobacco. The second payment, and the third in cases where a third is made, are based upon the net sale value of the tobacco grown on the farm, and thus reflect the yield and quality of the crop produced.

CROP-INCOME INSURANCE

Rental payments, which approximate one-third or more of the total payments under the tobacco program, are made regardless of production in the current crop. In the case of other payments, minimum rates are provided in each contract, and growers are guaranteed at least these minimum payments, even though they may produce less than their allotments.

In some of the contracts, the minimum rates are stated in terms of a specified number of dollars per acre of the rented acreage. In others, provision is made for "deficiency" payments to be made on each pound that the grower's production may fall below his allotment. This provides insurance against a partial or total crop failure.

All the tobacco contracts contain provisions for extending them through the crop year 1935-36.

I. THE KERR-SMITH TOBACCO ACT

The Kerr-Smith Tobacco Act was passed by Congress and approved by the President on June 28, 1934, in response to the request of tobacco growers participating in the adjustment programs.

The act supplements the adjustment programs, but it does not compel cooperation in these programs. It permits noncooperators to grow tobacco, and taxes them in an amount calculated to be equal to the difference between their returns from the higher prices resulting from the adjustment activities, and the returns they would have received on the same number of pounds of tobacco if no adjustment program had been offered.

The provisions of the act were made mandatory for 1934 for all tobacco harvested in the crop year 1934-35, except Maryland, Virginia sun-cured, and cigar-leaf tobacco. The act provided also that it could be applied to any type of tobacco in 1935-36 if "the Secretary of Agriculture determines that the persons who own, rent,

share-crop, or control three-fourths of the land customarily engaged in production of [that] particular type of tobacco favor the levy of the tax thereon."

TABLE 32.—*Growers' vote on Kerr-Smith Act, December 1934*¹

Class and type	Type no.	Acreage customarily engaged in production of tobacco	Percentage of land voted	Percentage of voted land voted in favor of tax for 1935
Flue-cured:				
Virginia.....	11	89,400	94.7	93.5
North Carolina.....	11	255,000	97.5	99.0
Total old belt.....	11	344,400	96.8	93.9
Eastern North Carolina belt.....	12	336,300	98.2	99.3
North Carolina.....	13	63,600	98.7	99.7
South Carolina.....	13	101,200	91.5	99.1
Total South Carolina belt.....	13	164,800	94.3	99.3
Georgia.....	14	77,900	91.0	93.4
Florida.....	14	5,700	76.4	97.6
Total Georgia and Florida belt.....	14	83,600	90.1	98.4
Total flue-cured.....	11-14	929,100	96.3	99.1
Fire-cured:				
Virginia.....	21	32,200	91.7	94.7
Kentucky.....	22	43,800	82.1	93.9
Tennessee.....	22	68,200	76.2	94.1
Total Clarksville and Hopkinsville.....	22	112,000	78.5	94.1
Kentucky.....	23	33,700	78.9	91.6
Tennessee.....	23	5,700	59.6	51.2
Total Paducah.....	23	39,400	76.1	87.0
Henderson stemming (Kentucky).....	24	4,800	57.1	79.3
Total fire-cured.....	21-24	188,400	79.7	92.6
Burley:				
Ohio.....	31	18,300	87.0	93.1
Indiana.....	31	11,600	87.0	90.0
Missouri.....	31	8,000	90.6	92.2
Kansas.....	31	700	97.3	96.1
Virginia.....	31	11,100	93.5	95.7
West Virginia.....	31	6,000	90.5	93.0
North Carolina.....	31	8,600	89.6	96.0
Kentucky.....	31	352,100	91.0	95.0
Tennessee.....	31	77,400	88.0	96.3
Total burley.....	31	493,800	90.3	95.7
Dark air-cured:				
Indiana.....	35	1,300	46.2	84.0
Kentucky.....	35	19,600	89.6	92.2
Tennessee.....	35	3,300	95.3	82.0
Total, 1-sucker.....	35	24,200	87.6	90.6
Green River (Kentucky).....	36	30,600	82.0	94.3
Virginia sun-cured.....	37	4,200	71.5	89.0
Total, dark air-cured.....	35-37	59,000	83.8	92.5
Total, above types.....		1,670,300	92.2	97.3

Tobacco section: Agricultural Adjustment Administration.

¹ All growers having an interest in the 1934 crop of tobacco of the above types were permitted to vote upon the question, Do you favor a tax on the sale of _____ tobacco for the crop year beginning May 1, 1935, as provided in the Kerr-Smith Act? Growers were required to state their 1934 acreage, and votes were tabulated according to the acreage voted. If any person having an interest in the 1934 crop voted No, the entire acreage in which that person had an interest was counted as not favoring the tax, regardless of how other persons having an interest in the same land voted. Referenda for Maryland type 32 and cigar-leaf types had not been conducted at the time these data were compiled.

A referendum conducted in December 1934 with respect to flue-cured, burley, fire-cured, and dark air-cured tobacco showed that the growers of these types were overwhelmingly in favor of continuing the tax in 1935-36. (See table 32.)

TAX ON FIRST SALE VALUE

The Kerr-Smith Act levies a tax of 33½ percent of the gross first-sale value of all tobacco harvested in the crop year 1934-35 (except Maryland, Virginia sun-cured, and cigar-leaf tobacco), but provides that the Secretary of Agriculture may prescribe a lower rate of tax (not less than 25 percent of the price for which such tobacco is sold) if he determines and proclaims that such lower rate will best effectuate the declared policy of the act. The Secretary prescribed a rate of 25 percent for the 1934-35 crop year. Every first sale of the types of tobacco taxed must be covered either by tax-payment warrants or by tax stamps.

The tax is payable by the seller. In effect, the burden of the tax falls upon growers who have not entered into adjustment contracts, since those who do not receive tax-payment warrants are obligated to purchase stamps.

The Secretary is directed to issue tax-payment warrants to growers who have entered into adjustment contracts and is authorized to issue such warrants to other growers for whom no equitable allotment could be obtained under a contract. The tax-payment warrants issued to the contracting growers are issued to cover all the tobacco which they are permitted to market under their contracts. These growers may not sell excess tobacco even by purchasing stamps to pay the tax on such excess.

INTERESTS OF SMALL GROWERS PROTECTED

The act provides that tax-payment warrants may be issued in any county to producers who could not obtain an equitable allotment under a contract to cover an amount of tobacco not exceeding 6 percent of the amount allotted to contracting growers in the county. The act further provides that warrants covering two-thirds of this quantity of tobacco "shall be issued to growers whose allotments are 1,500 pounds or less." This is to insure that the interests of small growers will be protected in making the allotments. The amount of tobacco allotted to any noncontracting grower to be covered by tax-payment warrants may or may not be equal to the amount of tobacco produced. Any sale made in excess of this quantity must be covered by tax stamps purchased by the noncontracting grower.

Preliminary tabulations show that in the crop year 1934 approximately 36,495 noncontracting growers received tax-payment warrants, under this provision of the act, of which 35,444 were growers whose allotments were 1,500 pounds or less.

REFERENDUM ON CONTINUING ACT FAVORABLE

The question of continuing the Tobacco Act in 1935 was submitted by referendum in December 1934, to persons who own, rent, share-crop, or control land customarily engaged in the production of flue-cured, burley, fire-cured, and dark air-cured tobacco. Votes were cast on the question: "Do you favor a tax on the sale of ----- (name

of type) tobacco for the crop year beginning May 1, 1935, as provided in the Kerr-Smith Act?"

The ballot for owners and renters showed the number of acres of tobacco harvested on the farm in 1934 (or tobacco acreage allotment), while the ballot for share-tenants and share-croppers showed the number of acres of tobacco harvested by the share-tenant or share-cropper in 1934 "including both your share and the landlord's share." It was essential to have the ballots identified with the land owned, rented, share-cropped, or controlled by the person voting, so that every vote would be related to the specific acreage to which it applied.

One or more voting places were designated in each county and remained open for a period of 10 days. Before the opening voting day, county agents mailed individual notices to all landowners and renters and to share-tenants and share-croppers whose names and addresses were available, specifying the times and places for voting in their localities. In addition, the places and times for voting were given general publicity.

To persons who had not voted within a specified number of days from the time voting began in their county, the county agents mailed cards for use in balloting. These voters either signed these cards and returned them by mail or returned them unsigned directly to the county agent.

Where ballots were cast in person, the balloting was secret, and ballots were not signed. Voters who found it necessary to mail their ballots were asked to sign the ballots in order to prove their right to vote. Information as to how any person voted, however, was confidential.

The period for voting was closed during the week ended December 22, 1934. Immediately after the voting was closed, county agents tabulated the votes and reported the returns to the tobacco section of the Agricultural Adjustment Administration. After that date, all voting cards used during the referendum were also mailed to the tobacco section.

A similar referendum among growers of the filler and binder types of cigar-leaf tobacco in the United States was planned for the early part of February 1935.

II. CIGAR TOBACCO

Cigar-leaf tobacco is grown in five districts in the United States: The Connecticut Valley, Pennsylvania-New York, Ohio-Indiana, Wisconsin-Minnesota, and Georgia-Florida. It usually represents about one-eighth of the total tobacco production of the United States. Practically the entire crop is consumed domestically.

Production-adjustment programs for the domestic cigar-leaf types were inaugurated in June 1933. Three separate programs were adopted at that time, one for the filler and binder types, one for the Georgia-Florida wrapper type, and one for the Connecticut valley wrapper type.

The first two programs offered benefit-payment contracts to individual producers. Under the program for Connecticut valley wrapper tobacco, production adjustment was effected through a marketing agreement with the handlers of that type of tobacco.

A production-adjustment program for the Puerto Rican type of tobacco, involving benefit-payment contracts with individual growers, was inaugurated in January 1934.

A processing tax at the rate of 3 cents per pound, farm sales weight, was levied on cigar-leaf tobacco, effective October 1, 1933. On cigar-leaf tobacco used in the manufacture of scrap chewing and smoking tobacco, the rate of tax will be 2 cents per pound, farm sales weight, from February 1, 1935. The determination to make this reduction was based upon evidence presented at a public hearing held November 9, 1934. Approximately 25 percent of all cigar-leaf tobacco used in the United States is used in the manufacture of scrap chewing or smoking tobacco.

FILLER AND BINDER TYPES

The contract offered to growers covering the 1933 crop, provided for a reduction of 50 percent in the acreage of tobacco harvested. In determining the base from which the reduction was required, growers were offered their choice of different methods in order to make the contract flexible enough to fit different situations on different farms.

Contracts were signed in 1933 by 17,668 growers with an aggregate base acreage of approximately 93,500 acres. The farms covered by these contracts grew 75 percent of the total crop during the base period, 1931 and 1932.

In 1933, the total production of these types was 49 percent of that in 1932, and the acreage harvested was 51 percent. The acreage harvested by all contracting growers was 29 percent of their aggregate base acreage. The 1933 production of the filler and binder types of tobacco was below consumption for the first time since 1930. Farm prices for the 1933 crop of these types averaged 7.2 cents per pound, compared with 5.8 cents for the 1932 crop. Contracting growers received approximately \$2,000,000 in benefit payments.

In March 1934 the Secretary of Agriculture exercised his privilege to continue the contracts for filler and binder types into 1934. At the same time, growers who had not previously executed contracts were permitted to sign for 1934. Also, a rider to the contract was provided in which additional choices were offered for determining the base tobacco acreage, and growers were given the opportunity to reduce acreage in 1934 by 33⅓ percent; 50 percent; or 100 percent.

PARTICIPATION INCREASES IN 1934

Approximately 4,959 additional contracts were signed by growers who had not taken part in the program in 1933, increasing participation in the program to 95 percent of the total number of growers.

All growers who had operated under contracts in 1933 were given the opportunity to execute the rider for 1934, along with the growers who had not previously signed contracts. For those who were under contract in 1933, the rider provided a supplemental first payment, in addition to the regular first payment; *Provided*, That proof satisfactory to the Secretary was presented "that the producer made a division acceptable to the Secretary of the 1933 payments with any tenant(s) and/or share-cropper(s) on this farm who had an interest in or participated in the production of the 1933 crop and who joined in the reduction thereof."

The first payments provided by the contract for 1934 were at the same rates per contracted acre as in 1933. These rates were uniform for all producers in each district, but varied among the districts as shown below. The rates of the supplemental first payments likewise varied among the districts as shown below.

District	First pay- ment per acre, 1934	Supple- mental first pay- ment per acre, 1934
New England.....	\$47	\$7
Pennsylvania-New York.....	24	4
Miami Valley.....	15	3
Wisconsin-Minnesota.....	20	3

The second payments provided by the contracts for 1934 were also to be at the same rates per contracted acre as in 1933 where the acreage reduction was maintained at the same rate as in 1933, that is, 50 percent from the base. For this reduction the amount of the second payment per contracted acre in each district was fixed at 40 percent of the average market value per acre of the tobacco harvested on the farm in 1934, except that in no event should the payment per contracted acre be less than \$32 for the New England district; \$17 for the Pennsylvania-New York district; \$11 for the Miami valley district; and \$14 for the Wisconsin-Minnesota district.

PROVISIONS OF CONTRACT

Where the 1934 acreage reduction was 33 percent, the contract provides that the amount of the second payment per contracted acre in each district shall be 35 percent of the average market value per acre of the tobacco harvested on the farm in 1934, except that in no event shall the payment per contracted acre be less than \$28 for the New England district; \$14 for the Pennsylvania-New York district; \$9 for the Miami valley district; and \$12 for the Wisconsin-Minnesota district.

Where the 1934 acreage reduction was 100 percent, the contract provides that the second payment per contracted acre shall be \$16 for the New England district; \$8.50 for the Pennsylvania-New York district; \$5.50 for the Miami valley district; and \$7 for the Wisconsin-Minnesota district.

Complete returns showing the number of growers choosing each option of reduction have not been tabulated, but it is estimated that approximately 60 percent reduced their acreage by 100 percent, 37 percent reduced by 50 percent, and 3 percent reduced 33½ percent.

The December estimate of the 1934 crop of these types of tobacco indicates 45,400 acres harvested and 54,266,000 pounds produced. This production is about 40,000,000 pounds less than estimated consumption. Consequently, stocks at the end of the current marketing season, including farm stocks, will show a further reduction, and the excess supply at that time is expected to be fully one-third less than the excess which was on hand when the program was adopted.

PRICES FROM 40 TO 50 PERCENT HIGHER

Reports from the producing districts indicate that prices for that part of the 1934 crop which has already been sold are ranging from 40 to 50 percent higher than those of a year ago.

In addition to improved prices for current production since the program has gotten under way, growers have profited through the sale of a large part of the tobacco which they had on hand when the

program started, and for which no market existed even at the low prices then prevailing.

A great deal of this tobacco was of the grades used in the manufacture of scrap chewing tobacco. The chief purchasers of these grades of tobacco entered into a marketing agreement in which they agreed to purchase not less than 18,500,000 pounds of these grades of tobacco during the period December 1, 1933, to June 30, 1934, at prices which were approximately 50 percent higher than those prevailing prior to the marketing agreement, and approximately 100 percent higher than those which had prevailed a year earlier. The total purchases under this agreement were 22,926,000 pounds.

GEORGIA-FLORIDA WRAPPER TYPE

In the Georgia-Florida district the growers of the type 62, shade-grown wrapper tobacco faced a critical situation in 1933 because of severely curtailed consumption of their tobacco and an abundance of old tobacco, particularly of the lower grades. While plans were being formulated, the harvesting of this crop was already under way, and steps were therefore taken to bring about a reduction in the quantity harvested.

Growers were offered contracts which provided benefit payments for leaving unharvested the low-grade portion of each tobacco plant. Nearly all growers signed contracts, and the crop was reduced by about 23 percent. The payments made to producers in return for this reduction amounted to approximately \$85,600. The contracts contained a provision for continuing them into 1934 and 1935.

In 1934 the Secretary exercised his privilege of continuing this program. At the same time a revised contract was offered to growers. This contract called for a reduction in the acreage planted in 1934 to two-thirds of the average acreage in the years 1929 to 1933.

It also provided for leaving unharvested the lower-grade portion of each tobacco plant as was done in 1933. Two payments were provided for by the contract for 1934. Each payment was fixed at the rate of \$30 per acre of the tobacco acreage harvested on the farm in 1934.

Every grower of this type of tobacco participated in the program in 1934, and the crop was restricted to an amount slightly under current consumption. Increased consumption over that in previous years has been reflected in higher prices to growers.

In December 1934, after a meeting with a committee representing the growers of this tobacco, the program was continued into 1935. The acreage allotted under the 1935 program represents an increase of about 15 percent over the 1934 acreage. The allotted acreage for 1935, with average yields, would give a crop approximately equal to current consumption.

CONNECTICUT VALLEY WRAPPER TYPE

Connecticut Valley wrapper tobacco is produced by a small number of growers, and growers themselves prepare most of it for market and handle it in interstate commerce. This situation lent itself readily to adjustment of production through a marketing agreement with the handlers. Ninety-three percent of the handlers signed a marketing agreement, and a license was issued to make the terms of the agreement applicable to all handlers.

Under the terms of this agreement all tobacco marketed from the 1934 crop was confined to production from an acreage determined by the Secretary to represent a desirable production of this type of tobacco for 1934. Under this plan the 1934 crop was approximately 10 percent smaller than the consumption of that year, and the excessive supplies existing in 1933 were reduced.

Prices to growers were improved through a minimum-price provision in the agreement with handlers. This provision was made effective for the 1933 crop. The farm price for that crop was estimated at 64 cents per pound as compared with 59 cents for the 1932 crop.

PUERTO RICAN TYPE

All the tobacco grown in Puerto Rico is of the cigar-leaf type. Production is about one-sixth as great as the production of cigar-leaf tobacco in the United States.

Benefit-payment contracts were offered to individual producers in January 1934, providing for an adjustment of production by reducing the quantity harvested from the 1933-34 crop and by reducing plantings of the 1934-35 crop. Approximately 10,400 growers, or more than 90 percent of the total number, entered into such contracts.

Only one harvesting was made from the 1933-34 crop, whereas normally two and sometimes three harvestings are made. As a result of the program, the 1933-34 crop was reduced by approximately 15 percent, to an amount approximately equal to the current rate of consumption. Plantings of the 1934-35 crop were reduced approximately 33 percent below the base established under the contracts. With normal yields, this crop will be sufficiently below current consumption to restore a normal relation between supply and consumption of this type of tobacco.

The contract for Puerto Rican tobacco provides for three classes of payments, as follows, (1) a first payment for the reduction of harvestings of the 1933-34 crop in the amount of \$10 per cuerda of tobacco harvested on the farm in 1933-34 by priming, and/or \$15 per cuerda of tobacco harvested on the farm in 1933-34 by stalk-cutting; (2) a rental payment for the 1934-35 crop in the amount of \$30 per cuerda of the rented acreage; and (3) an adjustment payment for the 1934-35 crop in the amount of 30 percent of the market value of the tobacco harvested on the farm in 1934-35, provided that in no event shall the adjustment payment be less than \$20 per cuerda of the rented acreage.

The first payments and rental payments have already been made, totaling approximately \$1,190,000. The adjustment payment, which will amount to approximately \$1,275,000, will be made after the 1934-35 crop has been harvested, and compliance has been established with all provisions of the contract.

III. FLUE-CURED TOBACCO

Flue-cured tobacco is grown in Virginia, North Carolina, South Carolina, Georgia, and Florida. It represents about half the total tobacco production of the United States. Approximately 60 percent of the crop is exported.

Approximately 97 percent of the total land used for the production of flue-cured tobacco during the years 1931, 1932, and 1933 was under

contract in 1934. The 1934 crop grown by contracting producers was reduced approximately 25 percent from the base established under the contracts. Total production in 1934 was reduced approximately 80 million pounds below the level of world consumption, and surplus stocks were entirely removed during the year.

It is estimated that had it not been for the adjustment program, production would have been around 50 percent larger than it actually was, which would have resulted in the largest supply of flue-cured tobacco on record.

Market prices for the 1934 crop of flue-cured tobacco averaged approximately 27 cents per pound compared with 15.3 cents per pound for the 1933 crop, and an average of 9.5 cents per pound for the 1931 and 1932 crops. The total income received by farmers from flue-cured tobacco during the marketing years for the 1933 and 1934 crops, including \$20,800,000 from rental and adjustment payments, is estimated at approximately \$284,000,000 or an average of \$142,000,000 per year.

This is more than two and three-fourths times the average farm income received from flue-cured tobacco during the 2 preceding years and represents the largest purchasing power ever recorded for flue-cured tobacco.

In the 1933 marketing season, after the flue-cured adjustment program had been inaugurated, the eight principal domestic buyers signed a marketing agreement under which they agreed to purchase out of the 1933 flue-cured crop, a total of at least 250 million pounds at an average price of not less than 17 cents per pound. The total purchases under this agreement were 285,681,000 pounds, and the average price paid was 17.4 cents per pound. Prior to the effective date of the agreement, September 25, 1933, these companies had purchased 52,132,000 pounds at an average price of 13.4 cents per pound.

The number of flue-cured adjustment contracts signed during the regular sign-up campaign was 106,860. After June 28, 1934, when the period for signing contracts was extended under the Kerr-Smith Act, 5,065 additional contracts were signed, making a total of 111,925 contracts in effect for 1934.

The total base acreage and base production under these contracts were 971,500 acres and 731 million pounds, respectively, and the averages per contract were 8.7 acres and 6,535 pounds.

At the option of the producer, the base was determined by acreage and production during the one or more of the years 1931, 1932, and 1933.

This made the program fit as many farms as possible and enabled a larger number of growers to obtain an equitable base under the contract than would have been possible if only one method had been provided for all growers.

CONTRACT PROVIDES FOR PAYMENTS

The contract provided for a rental payment, an adjustment payment, and a deficiency payment. It also provided a price-equalizing payment for those producers who marketed tobacco from the 1933 crop prior to the time the marketing agreement had become fully effective. This price-equalizing payment was equal to 20 percent of the net market value of the tobacco in the case of sales made prior to September 25, 1933, and 10 percent of the net market value in the case of sales made from September 25 to October 28, 1933.

The rental payment was at the rate of \$17.50 an acre for each acre kept out of tobacco production under the terms of the contract, and the adjustment payment was set at 12.5 percent of the net market value of the tobacco produced in 1934 under the terms of the contract. The deficiency payment was set at 2 cents per pound on the number of pounds (if any) by which production for market in 1934 was below the initial production allotment.

RULING MODIFIED CONTRACT

A reduction of 30 percent from the base was originally provided by the contract. However, when it became evident, shortly before planting time, that the 1934 crop might be materially below the desired level, owing to unfavorable weather on the one hand, and an increase in consumption on the other, an administrative ruling was issued allowing producers who desired to do so to plant as much as 80 percent of their base acreage and to market as much as 80 percent of their base production.

Payments for growers who took advantage of the ruling were reduced below those provided in the contract.

Where the acreage planted exceeded 70 percent of the base acreage but was not more than 80 percent of the base, approximately one-third of the rental payment provided in the contract was deducted.

Where the quantity of tobacco marketed exceeded 70 percent of the base tobacco production, but was not more than 80 percent of the base, the rate of the adjustment payment was reduced by successive steps from 12.5 to 8 percent of the net market value of the tobacco marketed, in proportion to the quantity of tobacco sold, as indicated in the following schedule:

Percentage that quantity of tobacco marketed is of base tobacco production	Percentage that adjustment payment is of net market value of tobacco marketed	Percentage that quantity of tobacco marketed is of base tobacco production	Percentage that adjustment payment is of net market value of tobacco marketed
Under 70.....	12.5	74 to 76.....	10.0
70 to 72.....	12.0	76 to 78.....	9.0
72 to 74.....	11.0	78 to 80.....	8.0

In accordance with the terms of the contract, if the base tobacco acreage for the farm was less than 4 acres, the rate of the adjustment payment was increased above that provided above by one-half of 1 percent for each tenth of an acre difference between 4 acres and the base tobacco acreage, except that in no event was the rate more than twice the rate provided above.

The ruling stated that "in no event shall the adjustment payment be based on a net average market price exceeding 21 cents per pound", as provided in the contract. The ruling further stated that "the initial production allotment prescribed in paragraph 2 (b) of the contract shall remain at 70 percent of the base tobacco production and the deficiency payment, if any, shall be 2 cents for each pound of tobacco that the quantity of tobacco marketed falls short of the initial production allotment for the farm or farms as provided in paragraph 19 of the contract."

GROWING CONDITIONS FAVORABLE

Growing conditions during the latter part of the season were favorable, and yields per acre obtained by most of the growers were fully up to normal. The yield per acre in 1934 was estimated at 794 pounds, compared with an average yield of 708 pounds for the preceding 5-year period. With this yield, the 1934 crop was estimated in December at 564,500,000 pounds, which was about as much below the level of world consumption as the 1933 crop was above that level.

The production of flue-cured tobacco by noncontracting growers was increased in 1934. However, notwithstanding this increase, it is estimated that less than 5 percent of the total 1934 crop was produced by noncontracting growers. A part of this tobacco was grown by persons who did not increase production in 1934 and for whom it was determined "that no equitable allotment of tobacco acreage or production is possible under * * * contracts offered pursuant to the Agricultural Adjustment Act."

Most of these growers received allotments of tax-payment warrants issued pursuant to section 5 (b) of the Kerr-Smith Tobacco Act. The 25-percent tax on the sale of tobacco provided under the act was paid in cash on approximately 2 percent of the total 1934 flue-cured crop.

PROCESSING TAX LEVIED

A processing tax at the rate of 4.2 cents per pound, farm sales weight, which was levied on the processing of flue-cured tobacco, effective October 1, 1933, has remained in effect for all flue-cured tobacco except that used in the manufacture of chewing tobacco. On the flue-cured tobacco used in the manufacture of plug chewing tobacco and twist, the rate of processing tax was reduced to 3.3 cents per pound on August 1, 1934.

After a public hearing on November 9, 1934, it was determined that the processing tax on flue-cured tobacco used in the manufacture of plug, twist, and other chewing tobacco will be at the rate of 2 cents per pound, from February 1, 1935. Approximately 10 percent of the flue-cured tobacco processed in the United States is used in the manufacture of these products.

PROGRAM FOR 1935

The 1935 flue-cured program provides for a smaller adjustment of production than was made in 1934. The complete liquidation of surplus stocks, which resulted from the 1934 program, made it possible to bring supplies down to a level slightly below their usual relationship with consumption.

With this relationship restored, the aim of the 1935 program is to maintain a balance between production and consumption by limiting the crop to an amount only slightly above the level of consumption. Statistical studies indicate that if the adjustment program were not continued, the production of flue-cured tobacco in 1935 would be practically double that of 1934, and far in excess of annual world consumption of this tobacco.

The notices extending operation of the adjustment contracts into 1935, which were mailed to growers prior to January 1, 1935, contained the following provisions:

1. The allotted acreage and production under each contract is 85 percent of the base.

2. The rate of the adjustment payment is 6.25 percent of the net market value of the 1935 crop, up to an amount equal to 21 cents per pound of the initial production allotment. The deficiency payment is at the rate of 1 cent per pound. In accordance with the terms of the contract, the rates for the reduction of 15 percent in 1935 are one-half those for the reduction of 30 percent in 1934.

3. The rental payment remains at \$17.50 for each rented acre.

Under an administrative ruling, issued concurrently with the notice, the acreage planted and quantity marketed by each contracting grower in 1935, may be modified at the option of the grower, as follows:

1. The acreage planted in 1935 may be more than 85 percent of the base tobacco acreage but not more than 90 percent, provided the rental payment is reduced to one-half the amount that would have been received if the acreage planted did not exceed the 85 percent specified in the notice.

2. The quantity of tobacco marketed in 1935 may exceed the "initial production allotment" (85 percent of the base) by not more than 12.5 percent of the initial production allotment, provided the rate of the adjustment payment is reduced by successive steps from the 6.25 percent of the net market value of the tobacco marketed, as specified in the notice, to zero, as sales exceed the initial production allotment, as indicated in the schedule below.

Percentage by which quantity marketed exceeds initial production allotment	Percentage that adjustment payment is of net market value of tobacco marketed	Percentage by which quantity marketed exceeds initial production allotment	Percentage that adjustment payment is of net market value of tobacco marketed
0.....	6.25	5 to 7.....	3.00
Under 1.....	6.00	7 to 9.....	2.00
1 to 3.....	5.00	9 to 11.....	1.00
3 to 5.....	4.00	11 to 12.5.....	0

In accordance with the terms of the contract, if the base tobacco acreage for the farm is less than 4 acres, the rate of the adjustment payment shall be increased above that provided above by one-fourth of 1 percent for each tenth of an acre difference between 4 acres and the base tobacco acreage, except that in no event shall the rate be more than twice the rate provided above.

Growers who have not previously signed contracts will be given an opportunity to do so for 1935, before the planting season for the 1935 crop.

IV. BURLEY TOBACCO

Burley tobacco is grown in Kentucky, Tennessee, North Carolina, Virginia, West Virginia, Ohio, Indiana, Missouri, and Kansas. It represents about one-fourth of the total tobacco production of the United States. Approximately 95 percent of the crop is consumed domestically.

In 1934 the production of burley tobacco was reduced below the level of consumption for the first time since 1928. Approximately 88 percent of the total land used for the production of burley during the years 1931, 1932, and 1933 was under contract in 1934. Total sales by all burley growers from the 1934 crop are not expected to exceed 250

million pounds. World consumption of burley is estimated at about 290 million pounds.

Market prices for the 1934 crop of burley tobacco during the first 2 months of the season averaged approximately 17 cents per pound, compared with an average price of 10.6 cents per pound for the 3 preceding crops. The total income received by farmers from burley tobacco during the marketing years for the 1933 and 1934 crops, including \$17,950,000 in rental and adjustment payments, is estimated at approximately \$98,000,000, or an average of \$49,000,000 per year. This represents a purchasing power 5 percent greater than the average purchasing power of burley tobacco during the 10 years 1919 to 1928.

In the 1933 marketing season, after producers had indicated a willingness to adjust production in 1934, domestic buyers signed a marketing agreement under which they agreed to purchase from the 1933 burley crop a total of at least 256 million pounds at an average price of not less than 12 cents per pound. The purchases under this agreement amounted to 286,387,000 pounds, and the average price paid was 12.6 cents per pound. Each contracting buyer purchased a quantity larger than that specified in the agreement at a price above 12 cents per pound.

CONTRACTS PROVIDE OPTIONAL REDUCTION

During the 1934 sign-up campaign which closed in March, 100,740 adjustment contracts were signed by producers of burley tobacco. After June 28, 1934, when the period for signing contracts was extended under the Kerr-Smith Act, 8,684 additional contracts were signed, making a total of 109,424.

The burley contracts, like those for other types of tobacco, provided that, at the option of the producer, the base may be determined by acreage and production in one or more of the years 1931, 1932, and 1933. The total base acreage and production under these contracts were 430,000 acres and 328,000,000 pounds respectively and the averages per contract were 3.9 acres and 2,995 pounds.

The average percentage reduction for all contracts in 1934 was 40 percent; a 33½-percent reduction was chosen by producers having about three-fifths of the base acreage, and a 50 percent reduction was chosen by producers having the remaining two-fifths of the base acreage. The total acreage and production allotted to contracting growers in 1934 were 259,000 acres and 197,650,000 pounds.

A rental payment, two adjustment payments, and a deficiency payment were provided under the terms of the contract. The rental payment was \$20 an acre for each acre of the rented acreage. The first adjustment payment was fixed at not less than 10 percent of the net sale value of the 1933 crop for producers whose reduction was 33½ percent; and not less than 15 percent of the net sale value of the 1933 crop for producers whose reduction was 50 percent. The second adjustment payment was fixed at not less than 15 percent of the net sale value of the 1934 crop for producers whose reduction was 33½ percent; and not less than 35 percent of the net sale value of the 1934 crop for producers whose reduction was 50 percent. The deficiency payment was set at 2 cents per pound on the number of pounds (if any) by which the 1934 production for market was below the initial production allotment.

PRODUCTION IN EXCESS OF ALLOTMENTS

The growing season in 1934 was favorable throughout most of the burley area. Production of a number of contracting producers was in excess of the allotments. The December estimate of the 1934 crop was 283,000,000 pounds, which represented an average yield of 813 pounds per acre. This was 7 percent above the average yield per acre allotted to contracting growers, and also above the average yield for burley during the last 5 years.

Before the opening of markets on December 3, 1934, the Adjustment Administration announced that growers signing contracts would put into unmerchantable form any tobacco they had produced that was in excess of sales made under contracts and administrative rulings, and that the total sales by all burley growers during the 1934-35 season would not exceed 250 million pounds.

When the markets opened for the 1934 crop, an administrative ruling was issued permitting each contracting producer to market a quantity of tobacco exceeding his production allotment by not more than 10 percent, provided he agreed to a reduction in the rate of his second adjustment payment.

The reduction in the rate of this payment increases as the quantity marketed exceeds the production allotment.

RATES OF ADJUSTMENT IN PAYMENT

Thus, instead of the full rate of 15 percent applicable to the net sale value of the 1934 crop grown under contracts for which the percentage reduction was 33½ percent, and the full rate of 35 percent applicable to the net sale value of the 1934 crop grown under contracts for which the percentage reduction was 50 percent, the rates shown in the schedule below are provided in the ruling:

Percentage by which weight marketed exceeds initial allotment	Percentage that second adjustment payment is of net market value of tobacco marketed	
	Where initial allotment equals 50 percent of base	Where initial allotment equals 66⅔ percent of base
0.....	35	15
Under 2.1.....	34	14
2.1 to 4.0.....	33	13
4.1 to 6.0.....	32	12
6.1 to 7.0.....	31	11
7.1 to 8.0.....	30	10
8.1 to 9.0.....	29	9
9.1 to 10.0.....	28	8

The rates of reduction in the second-adjustment payment provided in the ruling are such that it will be profitable for growers having excess tobacco to market only the better grades. For example, a grower who markets a quantity of tobacco 10 percent in excess of his initial production allotment must obtain a price per pound for the excess equal to at least two-thirds the price per pound obtained for the

tobacco sold within the initial allotment in order to receive as much total income from his tobacco, including the second-adjustment payment, as he would have received if no excess had been sold.

The second-adjustment payment will be made after the marketing of the 1934 crop has been completed. The first-adjustment payment, based upon the net sale value of the 1933 crop, was made from a branch office at Lexington, Ky., beginning in October. Approximately \$4,000,000 was disbursed in burley first-adjustment payments. The rates of the payment were the same as those specified in the contract.

The 1933 crop averaged 10.6 cents a pound. Although the Adjustment Administration had announced on January 26, 1934, that if the price of the 1933 crop averaged less than 12 cents per pound the rate of the first-adjustment payment would be increased, a meeting of tobacco committeemen held at Lexington in August 1934, voted to request the Administration not to increase these rates. This request was acceded to.

In making the request, growers indicated to the Administration that they would prefer to have the funds used toward continuation of the adjustment program into 1935 and later years instead of increasing the payments in 1934.

Reports upon the first 2 months of sales for the 1934 season show that the tax levied by the Kerr-Smith Act was paid in cash on approximately 20 percent of the Burley sold. The growers who paid this tax were those who did not sign adjustment contracts and therefore did not curtail their output in 1934. These reports indicate that with the increased prices for the 1934 crop, the income which noncontracting growers retained after paying the 25 percent tax was materially larger than they would have had if no adjustment program had been offered.

RATE OF PROCESSING TAX INCREASED

The rate of processing tax on all burley tobacco processed during the marketing year ended September 30, 1934, was 2 cents per pound, farm sales weight. On October 1, 1934, the beginning of the present marketing year, the rate was increased to 6.1 cents per pound, farm sales weight, the full difference between the current average farm price and fair-exchange value for burley tobacco determined as of that date. At the same time, the rate on burley used in the manufacture of plug and twist chewing tobacco was established at 4.1 cents per pound, farm sales weight.

After a public hearing on November 9, 1934, it was determined that the processing tax on burley tobacco used in the manufacture of plug, twist, and other chewing tobacco will be at the rate of 2.5 cents per pound, from February 1, 1935. Approximately 12.5 percent of the burley tobacco processed in the United States is used in the manufacture of these products.

PROGRAM FOR 1935

Notices providing for extension of the burley adjustment contracts into 1935 were mailed to producers before December 15, 1934. The adjustment for 1935 is a uniform reduction of 40 percent from the base established under the contract for all contracting producers, instead of

the optional rates of reduction of 33½ percent and 50 percent offered to producers in 1934. With a reduction of 40 percent in 1935, which was the average reduction for 1934, production will be below the level of consumption again in 1935. This will assure that a further liquidation of surplus stocks will be made.

The rate of the rental payment for 1935 remains at \$20 per acre of the rented acreage, as provided in the contract. The adjustment payments will be based upon the net sale value of the 1935 crop and will be at such rates, yet to be determined, as will tend to give producers the fair-exchange value for that portion of their 1935 production which is equal to domestic consumption. Approximately 95 percent of the burley crop is domestically consumed. The payment for deficiency of production remains at 2 cents per pound.

Growers who have not previously signed contracts will be given an opportunity to do so for 1935, before the planting season for the 1935 crop.

V. FIRE-CURED TOBACCO

Fire-cured tobacco is grown in Kentucky, Tennessee, and Virginia. It usually represents around 10 to 12 percent of the total tobacco production of the United States. Approximately two-thirds of the crop is exported.

During the current marketing season, fire-cured tobacco growers who signed production-adjustment contracts are eliminating approximately half the surplus of this type of leaf. This surplus, coupled with a decline in consumption, is held largely responsible for the low prices that prevailed on the markets before the adjustment program was inaugurated. As the contracts signed by producers early in 1934 already have been extended into 1935, it is expected that virtually all of the surplus of this type will be removed by the end of the next marketing season.

GROWERS' INCOME INCREASED

The total income received by farmers from fire-cured tobacco during the marketing years for the 1933 and 1934 crops, including \$2,040,000 in rental and adjustment payments, is estimated at approximately \$26,500,000, or an average of \$13,250,000 per year. This is approximately two-thirds more than the average income received from the two preceding crops.

In 1933, when launching of the adjustment program assured that supplies would be brought into line with normal needs, farmers received an average of 9.1 cents a pound for approximately 138,455,000 pounds of fire-cured tobacco. Two marketing agreements were negotiated with the principal domestic manufacturers using fire-cured tobacco, under which they agreed to pay higher prices for the 1933 crop in view of the pending reduction in production.

One of these agreements was with the three leading manufacturers of snuff, who use approximately 90 percent of all fire-cured tobacco used in the United States. Purchases by snuff companies under the agreement aggregated 31,979,000 pounds (including some dark air-cured tobacco), and the average price paid was 12.7 cents per pound.

The other marketing agreement, which related to the lower grades of fire-cured tobacco and Green River tobacco (dark air-cured), provided that tobacco of these types which did not bring a minimum bid of \$1.50 per 100 pounds on the market would be taken by one of

the manufacturers of tobacco by products at a price of \$1.25 per 100 pounds. Purchases under this agreement totaled 2,434,000 pounds at an average of \$1.32 per 100 pounds.

ACREAGE UNDER CONTRACT WAS 88 PERCENT

Approximately 22,200 adjustment contracts for fire-cured tobacco were signed during the regular sign-up period, and 1,550 additional contracts were signed after the Kerr-Smith Act was passed, making a total of 23,750 in effect for 1934. These contracts, like those for other types of tobacco, provided that the base may be determined by acreage and production in one or more of the years 1931, 1932, and 1933, at the option of the producer. The total base acreage and production under the contracts were 158,440 acres and 118,200,000 pounds, respectively, and the averages per contract were 6.7 acres and 4,980 pounds. The acreage of fire-cured tobacco grown by contracting producers during the years 1931, 1932, and 1933 represented 88 percent of the total acreage of fire-cured tobacco during these years.

A rental payment, two adjustment payments, and a deficiency payment were provided by the contract. The rental payment was set at \$12 per acre. The first adjustment payment was equal to not less than 7.5 percent of the net sale value of the 1933 crop; and the second adjustment payment, not less than 7.5 percent of the net sale value of the 1934 crop. The deficiency payment was set at 1.25 cents per pound on the number of pounds (if any) by which the 1934 production for market was below the initial production allotment.

With the favorable growing season which prevailed throughout the areas growing fire-cured tobacco in 1934, production was estimated in December at 128,894,000 pounds. This represented an average yield per acre of 852 pounds, which is 15 percent above the yield allotted to contracting growers and is the highest yield per acre recorded for fire-cured tobacco during the last 25 years.

INCREASED SALES PERMITTED

When the marketing season opened early in December, an administrative ruling was issued permitting contracting growers who desired to do so to sell tobacco in addition to their initial production allotments, in an amount not exceeding 15 percent of their allotments, provided they agreed to a reduction in the rate of the second adjustment payment. The rates of second adjustment payment set by the ruling are as follows:

Percentage by which weight marketed exceeds allotment	Percentage that adjustment payment is of net market value of tobacco marketed	Percentage by which weight marketed exceeds allotment	Percentage that adjustment payment is of net market value of tobacco marketed
0.0	7.5	8.1 to 11.0	4.0
0.0 to 2.1	7.0	11.1 to 13.0	3.0
2.1 to 5.0	6.0	13.1 to 15.0	2.0
5.1 to 8.0	5.0		

This ruling makes it possible for growers to market certain export grades of fire-cured tobacco that might not be marketed if sales were limited to the initial production allotments under the contracts. Under the ruling, it will be profitable for a grower to sell 15 percent in excess of his allotment provided the price per pound obtained for the excess is equal to more than 40 percent of the price per pound obtained for the tobacco sold within the initial production allotment.

For example, a grower who obtains an average price of 10 cents per pound for the sales within his allotment, on which the rate of second adjustment payment would be 7.5 percent, can profit by selling 15 percent in excess of his allotment, provided the excess brings more than 4 cents per pound. Contract signers are required to render unmerchantable any tobacco produced in excess of the allotment which is not sold under this ruling.

Allotments to all contracting growers indicate that they will sell not more than 95 million pounds of fire-cured tobacco during the current market season, including excess sold under the ruling. Sales of noncontracting growers are not expected to exceed 20 million pounds, so that the total of all fire-cured sales will not be more than 115 million pounds. The estimated world consumption of fire-cured tobacco for the current year is slightly above 130 million pounds.

Sales of fire-cured tobacco during the first 2 months of the 1934-35 marketing season show that the tax provided under the Kerr-Smith Tobacco Act was paid in cash on approximately 17 percent of the sales. It is estimated that noncontracting growers of fire-cured tobacco received allotments of tax-payment warrants to cover approximately 5 million pounds of tobacco in 1934.

PROCESSING TAX

A processing tax at the rate of 2.9 cents per pound, farm sales weight, was levied on the processing of fire-cured tobacco, effective October 1, 1933. After a public hearing on November 9, 1934, it was determined that the processing tax on fire-cured tobacco used in the manufacture of plug, twist, and other chewing tobacco will be at the rate of 2 cents per pound, from February 1, 1935. About 2 percent of the fire-cured tobacco processed in the United States is used in the manufacture of these products.

PROGRAM FOR 1935

Notices providing for extension of the fire-cured adjustment contracts into 1935 were mailed to producers before December 15, 1934. The adjustment for 1935 is a reduction of 20 percent from the base established under the contract for each producer, instead of the 25 percent reduction required in 1934. With this adjustment, production will be below the level of consumption again in 1935, so that an approximately normal relationship between supplies and consumption will be restored.

The rate of the rental payment for 1935 remains at \$12 per acre of the rented acreage, as provided in the contract. The adjustment payments will be based upon the net sale value of the 1935 crop and will be at such rates, yet to be determined, as will tend to give producers the fair-exchange value for that portion of their 1935 production which is equal to domestic consumption. The payment for deficiency of production remains at 1.25 cents per pound.

Growers who have not previously signed contracts will be given an opportunity to do so for 1935 before the planting season for the 1935 crop.

VI. DARK AIR-CURED TOBACCO

Dark air-cured tobacco is grown in Kentucky, Tennessee, and Virginia. It represents less than 5 percent of the total tobacco production of the United States. Approximately three-fourths of the crop is consumed domestically.

Under the adjustment program, the production of dark air-cured tobacco in 1934 was reduced below the level of consumption, so that a considerable part of the surplus was removed during the year. Approximately 77 percent of the total land used for the production of dark air-cured tobacco during the years 1931, 1932, and 1933, was under contract in 1934. These contracts called for a reduction of 30 percent. Total sales from the 1934 crop of this tobacco, including sales by noncontracting growers, are not expected to exceed 37,500,000 pounds. World consumption is estimated at slightly above 40 million pounds.

The total income received by farmers from dark air-cured tobacco during the marketing years for the 1933 and 1934 crops, including \$635,000 in rental and adjustment payments, is estimated at approximately \$5,800,000, or an average of \$2,900,000 per year. This is two-fifths more than the average income received from the two preceding crops, notwithstanding the fact that production in 1931 was double that of either 1933 or 1934.

In the 1933 marketing season, after producers had indicated a willingness to adjust production in 1934, three marketing agreements affecting dark air-cured tobacco were negotiated with domestic manufacturers. Two of these agreements were discussed under the preceding section on fire-cured tobacco.

Total purchases under the other agreement were 9,614,000 pounds and the average price paid was 8.5 cents per pound. The average price of the entire 1933 crop was 7.3 cents per pound, compared with an average of 4.2 cents per pound for the 1932 crop and 3.4 cents per pound for the 1931 crop.

ADJUSTMENT CONTRACTS SIGNED

Approximately 9,700 adjustment contracts for dark air-cured tobacco were signed during the regular sign-up period, and 380 additional contracts were signed after the Kerr-Smith Act was passed, making a total of 10,080 in effect in 1934. These contracts, like those for other types of tobacco, provided that the base may be determined by acreage and production in one or more of the years 1931, 1932, and 1933, at the option of the producer. The total base acreage and production under the contracts were 44,525 acres and 36,790,000 pounds, respectively, and the averages per contract were 4.4 acres and 3,650 pounds.

The contract provided for a rental payment, two adjustment payments, and a deficiency payment. The rental payment was set at \$12 per acre. The first adjustment payment was established at a rate equal to not less than 10 percent of the net sale value of the 1933 crop, and the second adjustment payment at not less than 10 percent of

the net sales value of the 1934 crop. The deficiency payment was fixed at 1.25 cents per pound on the number of pounds (if any) by which the 1934 production for market was below the initial production allotment.

1934 YIELDS ABOVE AVERAGE

With the favorable growing season which prevailed throughout the areas growing dark air-cured tobacco in 1934, production was estimated in December at 34,317,000 pounds. This represented an average yield per acre of 856 pounds, which is above the yield allotted to contracting producers and also above the normal yield for this tobacco.

When the marketing season opened in December an administrative ruling was issued permitting any contracting grower to sell tobacco in addition to his initial production allotment in an amount not exceeding 15 percent of his allotment, provided he agrees to a reduction in the rate of the second adjustment payment. The rates of the second adjustment payment set forth in the ruling are as follows:

Percentage by which weight marketed exceeds allotment	Percentage that adjustment payment is of net market value of tobacco marketed	Percentage by which weight marketed exceeds allotment	Percentage that adjustment payment is of net market value of tobacco marketed
0.0.....	10	9.1 to 11.0.....	6
0 to 3.1.....	9	11.1 to 13.0.....	5
3.1 to 6.0.....	8	13.1 to 15.0.....	4
6.1 to 9.0.....	7		

Under this ruling, it will be profitable for a grower to sell 15 percent in excess of his allotment whenever the price per pound obtained for the excess is equal to more than 40 percent of the price per pound obtained for the tobacco sold within the initial production allotment.

For example, a grower who obtains an average price of 10 cents per pound for the sales within his allotment, on which the rate of second adjustment payment would be 10 percent, can profit by selling 15 percent in excess of his allotment, provided the excess brings more than 4 cents per pound. Contract signers are required to render unmerchantable any tobacco produced in excess of the allotment which is not sold under this ruling.

Reports upon the sales of dark air-cured tobacco during the first 2 months of the 1934-35 season show that the tax levied by the Kerr-Smith Act was paid in cash on approximately 31 percent of the tobacco sold. It is estimated that noncontracting growers of dark air-cured tobacco received allotments in 1934 of approximately 1,500,000 pounds of tobacco to be covered by tax-payment warrants. Under the provisions of the act, Virginia sun-cured (type 37) was specifically exempted from the tax in 1934-35.

PROCESSING TAX

A processing tax at the rate of 3.3 cents per pound, farm-sales weight, was levied on the processing of dark air-cured tobacco, effective October 1, 1933. After a public hearing on November 9, 1934,

it was determined that the processing tax on dark air-cured tobacco used in the manufacture of plug, twist, and other chewing tobacco will be at the rate of 2 cents per pound from February 1, 1935. Approximately 55 percent of the dark air-cured tobacco processed in the United States is used in the manufacture of these products.

PROGRAM FOR 1935

Notices providing for extension of the dark air-cured adjustment contracts into 1935 were mailed to producers before December 15, 1934. The adjustment for 1935 is a reduction of 20 percent from the base established under the contract for each producer, instead of the 30 percent required in 1934. With this adjustment, production will be below the level of consumption again in 1935.

The rate of the rental payment for 1935 remains at \$12 per acre of the rented acreage, as provided in the contract. The adjustment payments will be based upon the net sale value of the 1935 crop and will be at such rates, yet to be determined, as will tend to give producers the fair-exchange value for that portion of their 1935 production which is equal to domestic consumption. The payment for deficiency of production remains at 1.25 cents per pound.

Growers who have not previously signed contracts will be given an opportunity to do so for 1935 before the planting season for the 1935 crop.

VII. MARYLAND TOBACCO

Maryland tobacco is grown only in a comparatively small area of southern Maryland. It represents less than 2 percent of the total tobacco production of the United States.

In 1934, production-adjustment contracts were signed by 702 growers of Maryland tobacco covering approximately 22 percent of the land used for its production. These contracts provide for a reduction of acreage and production equal to 25 percent of the base established under the contracts, which resulted in a curtailment in the crop of about 1,000,000 pounds. Rental and adjustment payments in connection with the 1934 program totaled approximately \$77,000.

The surplus of Maryland tobacco, most of which has accumulated since 1930, consists almost entirely of the lower grades. Until recently these grades were exported, but because of trade restrictions and efforts of foreign countries to encourage home production, exports have declined. The objective of the adjustment program has been to reduce production of the lower grades of this tobacco and in this way facilitate liquidations of price-depressing surplus. Consumption of Maryland tobacco in the United States, where the better grades of the crop are used chiefly in cigarettes, has increased in recent years.

Maryland tobacco was specifically exempted in 1934-35, along with Virginia sun-cured (dark air-cured) and cigar-leaf tobacco, from the tax levied by the Kerr-Smith Act upon the sale of tobacco.

A processing tax at the rate of 1.7 cents per pound, farm sales weight, was in effect for Maryland tobacco during the marketing year ended September 30, 1934. On October 1, 1934, the rate of processing tax on Maryland tobacco was reduced to zero. Funds collected during 1933-34 were sufficient to cover all payments required to continue the 1934 adjustment contracts in force during 1935.

PROGRAM FOR 1935

Notices providing for extension of the contracts into 1935 were mailed to producers before December 15, 1934. The adjustment of production and rates of payment in 1935 are the same as those in 1934; that is, the reduction in production is 25 percent, the rental payment is \$20 per rented acre, and the adjustment payment is 25 percent of a value computed for the tobacco which might be grown on the rented acreage.

It is not contemplated that production-adjustment contracts will be offered to additional growers of Maryland tobacco in 1935.

CHAPTER 8

SUGAR

SALIENT FACTS ABOUT SUGAR ADJUSTMENT

1. Estimated number of domestic growers participating.....	107, 000
2. Consumption quota established for United States for 1934 short tons.....	6, 476, 000
3. Rate of processing tax (per pound raw value).....cent.....	0. 5
4. Reduction in tariff on sugar (per pound raw value).....do.....	0. 5
5. Estimated annual return from processing tax which is to be paid to growers or expended for general benefit of agriculture in insular areas.....	\$64, 000, 000
6. Continental sugar-beet area 3-year program: 1934 quota.....short tons.....	1, 556, 166
Percent quota is of total United States quota.....	24. 03
7. Continental sugarcane area 3-year program: 1934 quota.....short tons.....	261, 034
Percent quota is of total United States quota.....	4. 03
8. Philippine Islands 1-year program: 1934 quota.....short tons.....	1, 015, 186
Percent quota is of total United States quota.....	15. 68
9. Puerto Rico 2-year program: 1934 quota.....short tons.....	802, 842
Percent quota is of total United States quota.....	12. 40
10. Territory of Hawaii 3-year program: 1934 quota.....short tons.....	916, 550
Percent quota is of total United States quota.....	14. 15
11. Cuban sugar: 1934 quota.....short tons.....	1, 901, 752
Percent quota is of total United States quota.....	29. 37

During 1934, the enactment and administration of the Jones-Costigan amendment to the Agricultural Adjustment Act were dominant factors affecting the welfare of sugar producers.

The year 1934 began with a large prospective surplus of supplies over consumption. On January 1, stocks of sugar in the United States totaled 2,246,000 short tons. In addition, it was estimated that supplies of offshore areas which would be available for the United States market in 1934 totaled 5,616,000 short tons. Against these totals of sugar stocks and supplies of 7,862,000 tons, the consumption for the year was estimated at only 6,450,000 tons, leaving a prospective surplus of 1,412,000 tons for the year 1934. This did not include the new beet-sugar crop, production of which begins in July of each year.

The Jones-Costigan Act, approved May 9, 1934, embodied in substance the principles outlined by the President in his message to Congress on sugar legislation, dated February 8, 1934.

In general, the act, which designated sugar beets and sugarcane as basic commodities, provided for:

(1) Adjusting available supplies for marketing to consumption requirements by establishment of quotas.

(2) Adjustment of production in the various producing areas to bring sugar produced within the limits of the quotas.

(3) Financing this adjustment through a processing tax on sugar.

Under the act, positive steps were taken in 1934 to alleviate the plight of the sugar producers. Consumption requirements for the United States for the calendar year 1934 were determined. In addition to the marketing quotas which the act established for sugar produced in continental United States, import quotas were determined for the Philippine Islands, Puerto Rico, the Virgin Islands, the Territory of Hawaii, and for Cuba and other foreign countries in accordance with the quota provisions of the act.

Adjustment programs designed to increase grower income were inaugurated or are being developed for producers in the United States, the Philippines, Hawaii, and Puerto Rico. A processing tax of one-half cent per pound, raw value, was imposed on sugar to provide funds to finance the program. Since the rate of processing tax did not exceed the simultaneous reduction in the tariff on Cuban sugar, the processing tax did not represent an added cost to the consumer.

I. THE JONES-COSTIGAN ACT APPLIED TO THE SUGAR INDUSTRY

Enactment by Congress of the Jones-Costigan Act made possible a sugar program with the following general objectives:

1. To retain sugarcane and sugar-beet acreage in the United States at approximately the average level of recent years.

2. To assure fair returns to the domestic producers by means of benefit payments made from processing-tax funds.

3. To stabilize sugar production in Puerto Rico, the Philippine Islands, the Territory of Hawaii, and the Virgin Islands at a level harmonious with the economic welfare of the various insular areas.

4. To arrest the decline of the imports of Cuban sugar into the United States, in order to increase the Cuban market for American products.

5. To prevent a rise in the price of sugar occasioned by the processing tax by means of an offsetting reduction in the duty on sugar imports.

ADMINISTRATION OF THE PROGRAM

When the act was approved, large shipments of offshore sugar from the 1933-34 crop, particularly from the Philippine Islands, were en route to the United States. In order to prevent admission of sugars arriving in excess of the probable quotas to be established, immediate determination of quotas was required.

CONSUMPTION REQUIREMENTS DETERMINED

Consumption requirements for the United States for the calendar year 1934 were announced on May 26, 1934, as 6,476,000 short tons, raw value. This figure was 24,000 short tons in excess of the base consumption figure mentioned in the act. The act provided that 30 percent of any increase in domestic consumption requirements above the base figure should be allocated to continental sugar-producing

areas. This amounted to 7,200 short tons, of which 6,166 short tons were added to the domestic-beet quota of 1,550,000 short tons, giving a total amount of beet sugar to be marketed in the United States in 1934 of 1,556,166 short tons, raw value. The remaining increase of 1,034 short tons in the consumption estimate brought the quota for sugar produced from domestic sugarcane to 261,034 short tons, raw value.

The act provided that after the quotas for domestic cane and beet producers had been determined, the remainder of the estimated requirements for domestic consumption should be apportioned among the insular areas on the basis of average receipts from such areas into the United States during the 3 most representative years of the period 1925-33.

QUOTAS ESTABLISHED

Accordingly, on June 12, 1934, the Agricultural Adjustment Administration issued "General sugar quota regulations, series 1" establishing quotas for the areas supplying the United States market. These regulations prohibited processors, handlers of sugar, and others from bringing in or importing into continental United States sugar for consumption in excess of the established quotas, and from marketing sugar manufactured from sugar beets or sugarcane in the United States in excess of the established quotas.

The act not only established the basis for determining total quotas for sugar-producing areas, but also established a basis for determining what part of such quotas could be in the form of direct-consumption sugar, which is sugar ready for consumption without further processing. For Cuba, 22 percent of the quota may be direct-consumption sugar; while for other areas the amount of such sugar which may be included in the quota is limited to the largest amount of such sugar shipped in any one of the years 1931, 1932, or 1933.

Of the 4,658,800 short tons remaining for allotment among the off-shore areas, after domestic allotments as required in the act had been established, a reserve of 17,000 tons was created for subsequent allotment to full-duty countries, leaving 4,641,800 short tons for the off-shore areas. The average amounts of sugar imported into the United States from the respective areas during the most representative 3 years were adjusted to this 4,641,800 short tons as shown in table 31.

Table 33 shows the average quantities received from off-shore areas in the most representative years, the quotas that were established, and the adjustments from the 3-year averages, and the off-shore and domestic quotas of sugar for marketing in the United States in 1934.

The off-shore quotas of direct-consumption sugars, which are included in the main quotas given in table 33, were as follows:

	<i>Short tons, raw value</i>		<i>Short tons, raw value</i>
Cuba.....	418, 385	Puerto Rico.....	133, 119
Philippine Islands.....	79, 661	Territory of Hawaii.....	26, 023

The quotas were determined by taking the average continental consumption of sugar from the Philippines, Puerto Rico, the Virgin Islands, and Cuba for the years 1931-33, and of Hawaiian sugar for the years 1930-32 and adjusting these averages to the 4,641,800 short tons available for allotment.

TABLE 33.—Average quantities of sugar received from off-shore areas in the 3 most representative years of the period 1925-33, adjustments from those averages and the off-shore and domestic quotas of sugar for marketing in the United States in 1934

Point of origin of sugar	Average quantities imported or received in the most representative years	Adjustment	Quota
OFF-SHORE			
Cuba.....	Short tons, raw value 1,934,500	Short tons, raw value 32,747.86	Short tons, raw value 1,901,752.14
Philippine Islands.....	1,032,667	17,481.32	1,015,185.68
Puerto Rico.....	816,667	13,824.80	802,842.20
Territory of Hawaii.....	932,333	15,782.84	916,550.16
Virgin Islands.....	5,564	94.19	5,469.81
Total.....	4,721,731	79,931.01	4,641,799.99
DOMESTIC			
Continental United States beet-sugar producing area.....			1,556,166.00
Louisiana and Florida cane.....			261,034.00

Hawaiian producers objected to the selection of 1930, 1931, and 1932 as the most representative years for that Territory. However, in a suit brought by the Hawaiian producers, *Ewa Plantation Co. et al. v. Henry A. Wallace, Secretary of Agriculture*, the selection of these years was upheld in the findings of the Supreme Court of the District of Columbia. In his opinion, Justice Bailey said:

Applying the declared policy of the act of adjusting production to consumption, and having due regard to the welfare of domestic producers and the protection of domestic consumers, it was reasonable and proper for the Secretary of Agriculture to select such years as the 3 most representative years, as would result in a sacrifice of approximately 8.3 percent of the current 1933-34 production (less local consumption) for Hawaii.

ADMINISTRATION OF THE QUOTAS

By arrangement with the Treasury Department, the Agricultural Adjustment Administration cooperated with the Bureau of Customs and relied upon the collectors of customs to maintain control at the ports of entry of all sugars entering the continental United States for consumption. Sugars from the various off-shore areas were allowed to enter the United States without restriction until the time when the quotas neared completion for the respective areas. At such times the sugar section certified to the respective collectors that each cargo was within the quota of the area of origin.

On June 21 the Secretary of Agriculture certified that the Philippine quota of 1,015,186 tons had been filled. On June 30 it was announced that all sugar from the Philippines arriving in the United States in excess of the quota would be placed in customs custody for release for marketing after January 1, 1935, when it would be charged against the 1935 quota. This action permitted shipment of all sugar from the 1933-34 crop destined for the United States market, but prevented sale in 1934 of amounts in excess of the quota. The shipments of Philippine sugar in excess of the quota totaled approximately 400,000 tons at the end of the year.

The majority of the Puerto Rican shipments were made early in the season, but small shipments of certain companies were not completed until late in the year. On November 20 the Secretary certified that the Puerto Rican quota had been filled.

Shipments of sugar from the Territory of Hawaii were rather evenly distributed throughout the year. Certification of exhaustion of the Hawaiian quota of 916,550 tons was made on November 30.

Cuba, the only other major off-shore producing area supplying the United States, had a quota of 1,901,752 short tons. The quota for direct-consumption sugar, equivalent to 418,385 short tons raw value, was closed October 26, and on December 18 the entire Cuban quota was certified as completed.

Differing circumstances in the several insular areas required different methods of applying the quota system within the respective areas. For the Philippines, because such a large proportion of the crop had been shipped at the time the quotas were announced, allocation of the quotas among shippers would have put at a disadvantage those who had not yet shipped substantial quantities. Therefore, no allotments to producers in the Philippines was made for 1934. In Puerto Rico it was found that allotments could be made.

Fundamental to the system of marketing and import quotas is an adjustment in production to bring the production of sugar into a reasonable balance with consumption, allowing for necessary reserves. This basic requirement was recognized by the Administration from the beginning of its sugar program and, as rapidly as feasible, programs seeking to adjust production were undertaken.

In contrast to other important agricultural industries in the United States, a close relationship exists between the producer and the processor in the sugar industry. Producers of wheat, cotton, and other major commodities raise their crops and market them to any or several of numerous processors or handlers and are dependent only upon the national or international demand for the commodities. The sugar producer, however, ordinarily sells his product to only one or two processors and in general is wholly dependent upon these specific processors for an outlet for his crop. Usually, the crop is contracted for by the processor before the growing season begins. Accordingly, it has been necessary to work out production adjustments consonant with marketing allotments made to individual processors.

In general, under programs for adjusting sugar-production-adjustment programs there is first allotted to each individual processor the amount of sugar which he may market during the calendar year and equitable shares of this marketing allotment are then distributed among the producers of cane or beets in continental United States who ordinarily sell to that processor.

II. SUGAR-BEET PROGRAM

In the United States the adjustment of sugar-beet production is the major production-adjustment problem. The beet-sugar marketing allotments to processors for 1934 were announced on July 26 when the Secretary approved United States Continental Beet Sugar Order No. 1. These allotments totaled 28,639,164 bags of refined sugar of 100 pounds each. A reserve of 448,036 bags was set up for adjustments. As a result of petitions and public hearings revisions were

made in the allotments of certain processors, and after these revisions had been made, the remainder of the reserve was prorated among all processors. After these revisions and prorations were completed, the allotments to beet-sugar processors in continental United States for the calendar year 1934 were as shown in Table 34.

TABLE 34.—*Marketing allotments to beet-sugar processors in continental United States for the calendar year 1934*

Name of processor	Allotment direct-consumption sugar	Name of processor	Allotment direct-consumption sugar
	<i>100-pound bags</i>		<i>100-pound bags</i>
The Amalgamated Sugar Co.....	2, 008, 549	Michigan Sugar Co.....	1, 403, 502
American Crystal Sugar Co.....	2, 913, 412	Monitor Sugar Co.....	435, 235
Central Sugar Co., Inc.....	188, 947	The National Sugar Manufacturing Co.....	141, 367
Franklin County Sugar Co.....	223, 401	Northeastern Sugar Co.....	193, 680
The Garden City Co.....	229, 018	The Ohio Sugar Co.....	197, 884
Great Lakes Sugar Co.....	590, 434	Paulding Sugar Co.....	211, 151
The Great Western Sugar Co.....	9, 690, 897	Rock County Sugar Co.....	120, 109
Gunnison Sugar Co.....	196, 201	Spreckels Sugar Co.....	2, 201, 839
Holly Sugar Corporation.....	3, 712, 393	St. Louis Sugar Co.....	209, 635
Isabella Sugar Co.....	290, 168	Superior Sugar Refining Co.....	176, 783
Lake Shore Sugar Co.....	67, 594	Union Sugar Co.....	75, 732
Layton Sugar Co.....	269, 932	Utah-Idaho Sugar Co.....	2, 906, 431
Los Alamitos Sugar Co.....	94, 519	West Bay City Sugar Co.....	148, 451
Menominee Sugar Co.....	189, 936		

To make certain that the beet-sugar processors should have adequate opportunity to market the full 1934 marketing quota, processors were asked in December 1934 whether they could use larger allotments or if they cared to make any unused portions of their allotments available for reallocation. As a result of this inquiry among the 27 beet-sugar processors, 4 relinquished portions of their allotments, 13 requested additional allotments, and 10 indicated no change was desired. A total of 125,388 bags of sugar relinquished by 4 companies was prorated to the 13 companies desiring additional allotments.

Acreage allotments available to growers in factory districts were made by reference to the marketing allotments of the processors and to recent experience of the growers as expressed in planted acres.

In making the allotments to growers, the first step was to translate each company's marketing allotment of bags of refined sugar into the number of acres necessary to produce that sugar on the basis of normal yields and sucrose content of beets. This acreage, minus a small reserve for adjustment, was the acreage available to the growers of that company.

However, in every case the total allotment for the growers of a company was at least 90 percent of the 1933 planted acreage, and not more than the acreage planted in 1933. In the case of multiple-unit companies, the total acreage was reallocated to growers in the respective factory districts on the basis of actual planted acreage in 1933. The year 1933 was the year of largest beet production for the country as a whole.

These allotments by districts were announced December 22. A public hearing on the allotments was held in Chicago, December 28. The allotments upon which the hearings were held are shown in table 35.

TABLE 35.—*Acreage allotments for sugar-beet production in the United States in 1935*

Company processing beets	Agricultural district	Acres
California:		
Amalgamated Sugar Co.	Clarksburg, Calif.	10,000
American Crystal Sugar Co.	Oxnard, Calif.	22,075
Holly Sugar Corporation	Santa Ana-Dyer, Calif.	6,792
Do.	Tracy-Alvarado, Calif.	21,237
Los Alamitos Sugar Co.	Los Alamitos, Calif.	4,892
Spreckels Sugar Co.	Spreckels, Calif.	18,602
Do.	Manteca, Calif.	35,170
Union Sugar Co.	Betteravia, Calif.	6,159
Colorado:		
American Crystal Sugar Co.	Rocky Ford, Colo.	22,081
Great Western Sugar Co.	Brighton, Colo.	10,225
Do.	Brush, Colo.	9,354
Do.	Eaton, Colo.	18,356
Do.	Fort Lupton, Colo.	12,369
Do.	Fort Morgan, Colo.	12,714
Do.	Fort Collins, Colo.	12,710
Do.	Greeley, Colo.	15,915
Do.	Longmont, Colo.	15,742
Do.	Loveland, Colo.	11,007
Do.	Ovid, Colo.	13,230
Do.	Sterling, Colo.	14,426
Do.	Windsor, Colo.	12,049
Holly Sugar Corporation	Delta-Grand Junction, Colo.	13,207
Do.	Swink, Colo.	12,929
National Sugar Manufacturing Co.	Sugar City, Colo.	5,800
Idaho:		
Amalgamated Sugar Co.	Burley-Twin Falls, Idaho	23,036
Franklin County Sugar Co.	Preston, Idaho	8,241
Utah-Idaho Sugar Co.	Sugar City, Idaho	10,026
Do.	Idaho Falls, Idaho	11,044
Do.	Blackfoot, Idaho	9,145
Do.	Shelley, Idaho	7,745
Indiana: Central Sugar Co.	Decatur, Ind.	9,909
Iowa: American Crystal Sugar Co.	Mason City, Iowa	16,824
Kansas: Garden City Co.	Garden City, Kans.	13,702
Michigan:		
Great Lakes Sugar Co.	Blissfield, Mich.	13,240
Isabella Sugar Co.	Mount Pleasant, Mich.	14,541
Lake Shore Sugar Co.	Holland, Mich.	4,607
Michigan Sugar Co.	Alma, Mich.	13,740
Do.	Bay City, Mich.	12,639
Do.	Caro, Mich.	10,831
Do.	Sebewaing, Mich.	11,189
Do.	Lansing, Mich.	7,969
Do.	Owosso, Mich.	12,981
Do.	Croswell, Mich.	6,052
Monitor Sugar Co.	Bay City, Mich.	17,234
Northeastern Sugar Co.	Mount Clemens, Mich.	11,700
St. Louis Sugar Co.	St. Louis, Mich.	8,400
Superior Sugar Refining Co.	Menominee, Mich.	9,380
West Bay City Sugar Co.	West Bay City, Mich.	8,009
Minnesota:		
American Crystal Sugar Co.	East Grand Forks, Minn.	24,094
Do.	Chaska, Minn.	16,591
Montana:		
Amalgamated Sugar Co.	Missoula, Mont.	10,714
Great Western Sugar Co.	Billings, Mont.	29,640
Holly Sugar Corporation	Sidney, Mont.	13,630
Utah-Idaho Sugar Co.	Chinook, Mont.	8,737
Nebraska:		
American Crystal Sugar Co.	Grand Island, Nebr.	8,823
Great Western Sugar Co.	Bayard, Nebr.	14,821
Do.	Gering, Nebr.	13,671
Do.	Lyman, Nebr.	7,694
Do.	Minatare, Nebr.	12,149
Do.	Mitchell, Nebr.	9,521
Do.	Scottsbluff, Nebr.	11,522
Ohio:		
Great Lakes Sugar Co.	Fremont, Ohio	8,963
Do.	Findlay, Ohio	7,873
Ohio Sugar Co.	Ottawa, Ohio	9,293
Paulding Sugar Co.	Paulding, Ohio	11,593
South Dakota: Utah-Idaho Sugar Co.	Belle Fourche, S. Dak.	11,571
Utah:		
Amalgamated Sugar Co.	Lewiston, Utah	13,009
Do.	Ogden, Utah	7,813
Gunnison Sugar Co.	Centerfield, Utah	7,423
Layton Sugar Co.	Layton, Utah	7,276

TABLE 35.—*Acreage allotments for sugar-beet production in the United States in 1935—Continued*

Company processing beets	Agricultural district	Acres
Utah—Continued.		
Utah-Idaho Sugar Co.	Garland, Utah	7,326
Do.	Brigham City, Utah	5,289
Do.	West Jordan, Utah	6,989
Do.	Spanish Fork, Utah	10,503
Do.	Springville, Utah	1,799
Washington: Utah-Idaho Sugar Co.	Bellingham, Wash.	4,405
Wisconsin:		
Rock County Sugar Co.	Janesville, Wis.	6,189
Menominee Sugar Co.	Green Bay, Wis.	8,416
Wyoming:		
Great Western Sugar Co.	Lovell, Wyo.	9,525
Do.	Wheatland, Wyo.	7,886
Holly Sugar Corporation.	Sheridan, Wyo.	8,544
Do.	Torrington, Wyo.	22,038
Do.	Worland, Wyo.	9,590

APPORTIONING ALLOTMENTS AMONG GROWERS

After assignment of acreage allotments to each of the sugar-beet factory districts in the United States, the factory district acreage allotments were apportioned among the growers. Individual acreage allotments sought to give each producer his equitable share of the total national acreage allotment. The method followed was as follows:

1. The sugar-beet adjustment contract specified five options, any one of which a grower might select as the basis for his allotment.

2. Applying his actual production experience to the option chosen, the grower was able to calculate his base acreage. The base acreages of all cooperating growers in each factory district were totaled. Where the total of the individual base acreages exceeded the factory-district acreage allotment a pro rata cut was applied to the base acreage of each farmer, and on the other hand where the total base acreages were less than the factory-district allotment, a pro rata increase was allowed.

This base acreage for each grower was calculated on the basis of his past experience. He had a choice of a 5-, 4-, 3-, or 2-year average of his past plantings from which to select a base acreage most advantageous for him.

PROGRAM AFFECTS 100,000 PRODUCERS

On October 2, the general outlines of the sugar-beet adjustment program and the features of the adjustment contract to be offered to growers were announced. It was estimated that the program would add approximately \$15,000,000 to the income that sugar-beet producers would receive in 1934 from the sale of their beets. The program affected approximately 100,000 producers in 19 States: Colorado, California, Michigan, Nebraska, Utah, Idaho, Montana, Wyoming, Ohio, Indiana, Illinois, Wisconsin, Minnesota, Iowa, North Dakota, South Dakota, New Mexico, Kansas, and Washington.

The program provided for adjustment payments to growers for 1934 and 1935 and for adjustment of production in 1935. Provision was made for extending the entire program to 1936 if such action were deemed advisable.

The contract provided for a parity return to growers on the 1934 and 1935 production and for 1936 if the program is extended for that

year. Growers were guaranteed adjustment payments for 1934 of at least \$1.25 a ton on either their actual production or the estimated yield of their planted acreage under normal conditions.

REFUNDS TO GROWERS

The Jones-Costigan Act specified that if the levy of the processing or floor-stock tax on sugar produced from the 1933 crop of sugar beets or sugarcane resulted in a decreased return to growers, a refund of an amount equalizing the whole or a part of the reduction in the returns to growers might be made.

The reason for this provision in the act is that sugar beets are customarily paid for by means of a participating contract, and the sale of the sugar produced from the 1933 crop would normally continue through the spring and summer of 1934. Thus the levy of the processing or floor-stock tax might have the effect of decreasing the returns to growers from their 1933 crops by reason of a decrease in the net receipts to processors for such sugars, which in turn would be reflected to the detriment of the grower through the participating contract.

In November 1934 the Secretary of Agriculture made a finding with respect to the reduction of returns to growers on the 1933 crop by reason of the levy of the processing and floor-stock tax, and subsequently made a determination to compensate growers for such reduction. The total amount which will be paid in the form of refunds on the 1933 sugar-beet crop is estimated at \$2,600,000.

DEFICIENCY PAYMENTS

In addition to payments based upon the actual production from the acreage allotted to individual growers for 1935, and for 1936 if the Secretary of Agriculture exercises the option to extend the contract to cover that year, the contract provides for deficiency payments to be made on the estimated production of the individual's planted acreage where there is a bona fide abandonment by reason of drought or other natural calamity. In this manner growers receive an additional benefit in the form of a partial crop-income insurance.

The Jones-Costigan Act proved of exceptional value to sugar-beet producers in the first year of its operation because of the severe drought conditions during the summer of 1934, which affected adversely many growers in the sugar beet raising areas. Although the acreage planted to sugar beets in 1934 was not substantially less than the exceptionally high planted acreage of the previous year, production was considerably less on account of the drought.

PRODUCTION PROTECTED FROM OUTSIDE COMPETITION

Had it not been for the protective provisions of the Jones-Costigan Act, the sugar-beet growers would have been confronted not only with a short crop, but extremely low prices brought about by large shipments of insular and foreign sugars, of which there was an abundant supply which would have found its way to the American market to replace domestically grown beet sugar.

Any producer who grew beets in 1933 or 1934 was eligible to receive adjustment payments, provided the land upon which the

beets were raised was placed under an adjustment contract for 1935 and 1936. Where a producer did not have control over the land through 1936, it was necessary for him to secure the signature of the party who would control the land in 1936.

The first installment of the 1934 adjustment payment was \$1 a ton on the estimated production of the farm. This payment was due to growers as soon as contracts were signed and approved. The second installment was to go to growers in 1935 after compliance with the contract was checked.

III. SUGARCANE PROGRAM

The Louisiana sugarcane production-adjustment program was developed after conferences with processors, producers, and other interested parties in the sugarcane area. The program offered farmers production-adjustment contracts covering the 1935 crop and giving the Secretary of Agriculture the option of extending the program to cover the 1936 crop in order to limit production in these years to Louisiana's portion of the 260,000 tons provided for in the Jones-Costigan Act. It offered farmers cash benefits for 1934 and 1935 in consideration of their cooperation. The total benefits for the 1934 crop were estimated at approximately \$7,500,000.

No marketing allotments were made to Louisiana processors for 1934 as it was apparent that the total production of sugarcane in Louisiana and Florida would not exceed the marketing quota for continental cane sugar provided in the act.

Because the rate of adjustment payment to cooperating producers depended in part upon the amount which producers received from the processors for their cane, producers and processors submitted for approval of the Agricultural Adjustment Administration the form of contract under which processors proposed to purchase cane.

BASIS FOR ADJUSTMENT PAYMENTS

The schedule of payments for sugarcane of the 1934 crop contained in the Louisiana sugarcane purchase contract, as mutually agreed upon by Louisiana processors and growers, was declared acceptable as a basis for determining adjustment payments to producers in the Louisiana program.

Prices were based on sucrose content and market quotations of raw sugar on the New Orleans Sugar and Rice Exchange. The contract provided for a grower-processor committee with a chairman to be appointed by the Secretary of Agriculture, and also provided for a trust-fund arrangement to assure payment of final amounts due to growers on their cane after the first payment was made. The chairman of the grower-processor committee was authorized to adjudicate disputes under the contract, with the possibility of appeal to the Secretary of Agriculture.

Under the cane-purchase contract the processors agreed to pay for sugarcane delivered under the contract the prices per ton of 2,000 pounds that are shown in table 36.

TABLE 36.—*Prices to be paid for Louisiana sugarcane under 1934-35 grower-processor contract*

Percent sucrose in normal juice	Percent of price of standard cane	Quotations on raw sugar, New Orleans Exchange (In dollars per 100 pounds)				
		2.00	2.50	3.00	3.50	4.00
9.5.....	85	<i>Per ton</i> \$1.29	<i>Per ton</i> \$1.70	<i>Per ton</i> \$2.14	<i>Per ton</i> \$2.62	<i>Per ton</i> \$3.13
10.0.....	90	1.37	1.80	2.27	2.77	3.31
10.5.....	95	1.44	1.90	2.39	2.93	3.50
11.0-12.0.....	100	1.52	2.00	2.52	3.08	3.68
12.5.....	105	1.60	2.10	2.65	3.23	3.86
13.0.....	110	1.67	2.20	2.77	3.39	4.05
13.5.....	115	1.75	2.30	2.90	3.54	4.23
14.0.....	120	1.82	2.40	3.02	3.70	4.42

In order for a sugarcane grower to receive the benefits of the adjustment program, it was necessary for him to enter into a contract with the Secretary of Agriculture.

On November 21 the Agricultural Adjustment Administration announced approval of the sugarcane-adjustment contract, which was the mechanism through which the program was applied to the individual grower. Adjustment payments were based on the production of the farm, and each farm was given a production allotment determined from its past production. The producer had the option of a 2-, 3-, 4-, or 5-year base period, or he could choose 70 percent of his 1933 or 1934 production. For a limited number of new producers, provision was made for a base to be determined by the Secretary.

Each grower agreed to the necessary pro-rata adjustment of his base production to bring the total for Louisiana to that allowed by the quota. Each grower agreed not to produce more than his allotment nor to plant more acreage than necessary to produce it.

NUMBER OF SHARE-CROPPERS NOT TO BE REDUCED

The adjustment contract also provided that where a processor was also a producer, he would be obligated to purchase cane upon the basis of the grower-processor contract in order to be eligible for the adjustment payments as a producer. Approximately 40 percent of the Louisiana sugarcane was grown by producers who were also processors. The number of share-tenants or share-croppers was not to be reduced as a result of the adjustment program, below the number on the farm in 1934.

Adjustment payments under the sugarcane contract began as soon as contracts were signed and approved. The first installment of the payment on the 1934 crop for a given farm was set at \$1 a ton of its base production. Where the Secretary estimated that the actual production was less than the base production, the advance 1934 payment was on the estimated production.

The contract provided for a final 1934 payment which, when added to the advance 1934 payment and to the average market price for sugarcane as ascertained by the Secretary, would net the producer the parity price for the sugarcane he produced and delivered from the 1934 crop.

PAYMENTS IN 1935

For the 1935 crop, the contract provided that payments were also to be in two installments, with a guaranteed minimum advance payment of 50 cents per ton of sugarcane. The sugarcane contract provided for partial crop-income insurance through deficiency payments of \$1 a ton on the estimated production of land which had to be abandoned because of general conditions over which the grower had no control. For instance, if a general abandonment of acreage should occur as the result of freezing weather after November 1, growers thus affected would receive \$1.50 per ton on the estimated production of the abandoned land.

Approximately 11 percent of the sugarcane marketed in Louisiana goes into the production of sirup and molasses. Early in the year the rate of the processing tax on sirup of cane juice and edible molasses was reduced from $\frac{1}{2}$ to $\frac{1}{8}$ cent a pound of the total sugar content, translated into terms of raw value. This was done after testimony introduced at a public hearing held in Washington on May 28, 1934, had indicated that the higher rate would tend to cause accumulation of surplus stocks and consequent lowering of the farm price of cane.

FLORIDA PROGRAM TO BE DEVELOPED

A production-adjustment program for Florida sugarcane was in process of development at the end of the year. As a result of a severe frost in Florida in December 1934, the crop was reduced to a figure which trade sources estimated at approximately 30,000 tons. Consequently no marketing allotments were contemplated for Florida in 1935.

IV. INSULAR PROGRAMS

The development of production-adjustment programs in the insular sugar-producing areas went forward at the same time that similar programs were being introduced in the continental sugar-beet and sugarcane areas.

The contributions to sugar consumption of the United States made by the various areas as indicated in table 37 provided the basis upon which the quotas and the consequent adjustments were based.

TABLE 37.—*Sugar consumption in continental United States and contributions from all areas, 1925-33, and 1934 quotas in short tons, raw basis*

[Quantities of the 3 most representative years in italics]

Year	Consumption	Continental United States				Contributions			
		Beet		Cane		Hawaii		Puerto Rico	
		Tons	Percent	Tons	Percent	Tons	Percent	Tons	Percent
1925.....	6,603,000	1,063,500	16.11	149,500	2.26	763,000	11.56	603,500	9.14
1926.....	6,796,500	1,046,000	15.39	84,000	1.24	740,500	10.90	551,000	8.11
1927.....	6,348,000	935,000	14.73	46,500	.73	762,000	12.00	578,000	9.11
1928.....	6,642,500	1,243,000	18.71	138,500	2.08	819,000	12.33	698,500	10.52
1929.....	6,964,000	1,026,500	14.74	189,000	2.71	928,500	13.33	460,000	6.61
1930.....	6,710,500	1,140,500	17.00	197,500	2.94	806,000	12.01	780,000	11.62
1931.....	6,561,500	1,343,000	20.47	206,000	3.14	967,000	14.74	748,500	11.41
1932.....	6,248,500	1,318,500	21.10	160,000	2.56	1,024,000	16.39	910,500	14.57
1933.....	6,316,000	1,366,000	21.63	315,000	4.99	989,500	15.67	791,000	12.52
Quota, 1934...	6,476,000	1,556,166	24.03	261,034	4.03	916,550	14.15	802,842	12.40

TABLE 37.—*Sugar consumption in continental United States and contributions from all areas, 1925-33, and 1934 quotas in short tons, raw basis—Continued*

[Quantities of the 3 most representative years in italics]

Year	Contributions—Continued							
	Philippine Islands		Virgin Islands		Cuba		Foreign countries other than Cuba	
	Tons	Percent	Tons	Percent	Tons	Percent	Tons	Percent
1925.....	485,000	7.35	10,000	0.15	3,486,000	52.79	40,500	0.61
1926.....	375,000	5.52	<i>6,000</i>	.09	3,944,500	58.04	47,500	.70
1927.....	521,000	8.21	6,500	.10	3,491,000	54.99	6,500	.10
1928.....	570,500	8.59	11,000	.17	3,125,000	47.05	35,000	.53
1929.....	724,500	10.40	4,000	.06	3,613,000	51.88	17,500	.25
1930.....	804,500	11.99	<i>6,000</i>	.09	2,945,500	43.89	30,500	.45
1931.....	<i>815,000</i>	12.42	2,000	.03	<i>2,440,000</i>	37.19	40,000	.61
1932.....	<i>1,042,000</i>	16.68	4,500	.07	<i>1,762,500</i>	28.21	26,500	.42
1933.....	<i>1,241,000</i>	19.65	<i>4,500</i>	.07	<i>1,601,000</i>	25.35	8,000	.13
Quota, 1934.....	1,015,186	15.68	5,470	.08	1,901,752	29.37	17,000	.26

HAWAII

A 3-year program assuring a minimum of about \$8,500,000 in adjustment payments annually for Hawaiian sugar producers was outlined on December 24, 1934, following a series of conferences held by Agricultural Adjustment Administration officials and representatives of the Hawaiian Sugar Planters' Association.

The agreement between the Secretary of Agriculture and the Hawaiian sugar producers afforded the basis for consideration, at a hearing called in Honolulu, of the various points which had been raised in connection with quotas and benefit payments, with the expectation that an adjustment program satisfactory both to the Secretary of Agriculture and the Hawaiian producers might be developed rapidly.

The proposed Hawaiian program was to be made effective through a production-adjustment contract between the Secretary of Agriculture and the Hawaiian producers.

In this contract the producers and processors would agree to: (1) Abide by quotas and allotments established by the Secretary; (2) adjust production in accordance with the terms of the contract; (3) abide by labor provisions similar to those in domestic beet and cane adjustment contracts; (4) adjudication by the Secretary of disputes arising in connection with the production and processing of cane; and (5) examination of books and records by the Secretary.

PHILIPPINE ISLANDS

The Agricultural Adjustment Administration established a field office in Manila during the latter part of July for the development and administration of the sugarcane adjustment program in the Philippine Islands. After considerable work in the field and conferences and public hearings with producers and processors, the Agricultural Adjustment Administration announced on November 21 that a marketing agreement for sugar produced in the Philippine Islands has been tentatively approved by the Secretary of Agriculture.

The agreement provided for allotting, among processors and handlers of sugar in the Philippines, the quota established under

the Jones-Costigan Act, and for the Governor General or the Philippine Legislature to allot the Philippine local consumption requirements and emergency reserve.

An important provision of this agreement was that in which the contracting millers, refiners, and handlers agreed not to ship to the United States any sugar between October 16, 1934, and December 31, 1934. This provision was an effort to prevent a seasonal depression of price from over-accumulation of stocks in the United States.

Millers, refiners, and handlers who signed the agreement, agreed to abide by allotments to be established: (1) To mill and handle only cane or sugar produced in accordance with allotments; (2) to keep uniform records; (3) and to assist in the administration of the agreement.

Administration of the agreement was to be by a control committee composed of 1 member selected by the Secretary of Agriculture, 2 representatives of the millers, 1 representative of refiners, and 1 representative of the handlers.

LIMITATION LAW ENACTED BY PHILIPPINE LEGISLATURE

To supplement the Jones-Costigan legislation, a sugar limitation law, enacted by the Philippine Legislature and approved by the Governor General became effective December 4, 1934. It established the machinery necessary to enable the islands to carry out the purposes of the United States sugar legislation, and is to be in force for 3 years.

After allotments to processors in the Philippines had been made under the marketing agreement and the sugar limitation law, milling allotments for the 1934-35 crop were given to individual producers. This was done by means of the Philippine production adjustment contract.

Benefit payments in the Philippine Islands were determined by the difference between the amount of cane of the 1933-34 crop, milled in the planter's name, and his permitted, restricted production of the 1934-35 crop. This payment was set at the rate of approximately \$2 for each ton by which the 1933-34 cane milled fell below the production authorized for 1934-35.

BENEFIT PAYMENTS AID IN TRANSITION PERIOD

The Philippine program was designed to reduce in one season an estimated crop of 1,571,000 short tons of sugar, raw value, to approximately 772,000 short tons, raw value. Although this represented a sharp reduction, it was an adjustment which Philippine planters would necessarily have had to effect under the Tydings-McDuffie Act, also known as the Philippine Independence Act. When that act becomes effective it will limit the duty-free imports of sugar into the United States from the Philippines to about 956,000 short tons annually. Through cooperation in the adjustment program, Philippine planters were enabled to receive adjustment payments to aid them in making the transition to a lower level of production as required by the Independence Act.

It was estimated that Philippine planters would receive \$14,000,000 in benefit payments. The program sought to reduce the 1934-35 crop to the point at which production, plus excess quota sugar in the United States at the end of 1934, would be approximately the amount

necessary to fill the import quota established by the Secretary of Agriculture, to meet the requirements of insular consumption, and to maintain adequate reserves.

The contract provided for benefit payments to planters in three installments. The assistance and cooperation of the Governor General of the islands and his staff were important factors in the development and administration of the Philippine sugar-adjustment program.

PUERTO RICO

The 1934 marketing quota for sugar from Puerto Rico was fixed by the Secretary of Agriculture at 802,842 short tons, raw value, on June 9, 1934. Puerto Rican Sugar Order No. 1, issued July 25, 1934, allotted this quota among the various Puerto Rican mills. At the time the order was issued, however, some of the mills had already overshipped their allotments. Adjustments to equalize inequities resulting from this situation were made at the time of allotting the 1935 Puerto Rican sugar quota among the mills.

After fulfillment of the 1934 quota there was in Puerto Rico a carry-over of approximately 225,038 short tons of sugar. The 1934-35 crop was estimated to be equivalent to 1,000,000 tons of sugar. Thus, the total supply of Puerto Rican sugar in 1935 was approximately 1,225,038 short tons, raw value, of sugar. The quota for marketing in the continental United States in 1935, fixed by the Secretary of Agriculture on January 5, 1935, was 779,420 short tons, raw value. Requirements of sugar for domestic consumption were estimated at 60,000 tons for the year 1935. Thus, there existed a surplus, in terms of sugar, raw value, of 385,618 tons.

REMOVAL OF EXCESS IN 1935

The plans laid down by the Department of Agriculture for production adjustment in Puerto Rico contemplate the removal in 1935 of approximately 263,200 tons of the above-mentioned excess, through the payment to cooperating growers of \$4 per ton upon sugar cane not processed, which was produced in excess of allotments assigned to them upon the basis of past production experience.

This will mean carrying into 1936 approximately 122,418 short tons of sugar which cannot be marketed in 1935.

Plans further contemplate the absorption in 1936 of 100,000 short tons of surplus sugar that is in excess of quota requirements by means of adjustment in production compensated upon the basis of the tons of sugarcane delivered under production allotments assigned by the Secretary. Thus, the surplus of 385,618 tons in 1935 will have been reduced by 1937 to 23,838 tons.

Before the development of the adjustment program for Puerto Rico an expert commission was selected by the Agricultural Adjustment Administration to work out a satisfactory method of effectuating a sugar-adjustment program and relating it to a broader program for the general benefit of agriculture.

The plans of the Department of Agriculture regarding the reduction of the sugarcane crop in Puerto Rico were developed with the idea of fitting the sugar program into a comprehensive plan for the rehabilitation of agriculture in Puerto Rico that the present program has developed.

V. PROCESSING TAX

The processing tax is basic to the production adjustments in sugar as in other commodities, because it furnishes the funds for adjustment payments that enable producers to adjust their production to the levels sought by the general program.

The Jones-Costigan Act provided for a processing tax of 0.5 cent a pound, raw value, on sugar. It also provided that in order to prevent increases in cost of sugar to the consumer as a result of the processing tax, the tax should not exceed the amount of the reduction by the President of the rate of duty in effect on January 1, 1934, under paragraph 501 of the Tariff Act of 1930.

Under the act the processing taxes collected on sugar from insular possessions and territories may be kept in a separate fund to be used in those areas for payments to producers for reduction in production, or for the general benefit of agriculture in those areas. It is estimated that processing and related taxes will total approximately \$207,707,000 during the 3 years of the life of the Jones-Costigan Act.

Up to November 30, 1934, processing, floor stock, and compensating taxes collected on sugar totaled \$27,721,408.04.

VI. LABOR PROVISIONS

Because of the special labor conditions prevailing in sugar production, the act specifically provided that in order more fully to effectuate its declared policy:

* * * all agreements authorized by this act relating to sugar beets, sugarcane, or the products thereof, may contain provisions which will limit or regulate child labor and may fix minimum wages before workers or growers employed by the producers and/or processors of sugar beets and/or sugarcane who are parties to such agreement; and the Secretary, upon * * * request * * * is hereby authorized to adjudicate any dispute as to any of the terms under which sugar beets or sugarcane are grown or are to be grown and/or marketed, and the sugar and byproducts thereof are to be marketed. The decision and any determination of the Secretary shall be final.

In accordance with these provisions of the act, the sugar beet and sugarcane production allotment contracts for the continental United States contain clauses which limit the use of child labor on the premises of the producer and/or processor, give the Secretary of Agriculture authority to establish minimum wages for work performed in connection with the 1935 and/or 1936 crop if he sees fit to do so, and also to adjudicate any labor dispute involving the producer and/or processor and arising out of the production of sugar beets or sugarcane.

In addition to this, the producer is obligated to pay promptly all bona fide wage claims arising in connection with the production, cultivation, and/or harvesting of the 1934 crop.

The labor provisions of the Philippine sugarcane production adjustment contracts are limited to clauses requiring the planter to pay all bona fide claims for wages and to accept adjudication by the Secretary of Agriculture in any labor dispute arising in connection with the production of sugarcane.

By reason of the fact that the labor provisions in the adjustment contracts relate in the main to the 1935 and 1936 crops, no specific accomplishment in the field of employment relations can yet be cited,

aside from the adjudication by the Secretary of Agriculture in November 1934, of a wage dispute in the Scottsbluff, Nebr., sugar beet producing area.

This settlement took place before the adjustment contracts were offered to producers and was effected on the basis of voluntary agreement by both parties to accept the decision of the Secretary. Arrangements are now being made to adjudicate disputes between producers and laborers over the payment of wages due for work performed during the 1934 season.

CHAPTER 9

CATTLE

SALIENT FACTS ABOUT CATTLE ADJUSTMENT

	<i>Head</i>
1. Approximate increase in cattle numbers, 1928 to 1934.....	10, 000, 000
2. Approximate cattle numbers Jan. 1, 1934.....	67, 000, 000
3. Approximate reduction during 1934.....	10, 000, 000
4. Number of cattle bought under drought cattle-purchase program..	7, 800, 000

Cattle became a basic commodity under the Agricultural Adjustment Act with the approval, on April 7, 1934, of the Jones-Connally Act, amending the Agricultural Adjustment Act to designate cattle and other products basic agricultural commodities.

This made it possible to apply the powers of the act to adjust beef-cattle production and to develop a program under which producers of cattle would be eligible to receive benefit payments for adjusting their production in accordance with such a program.

Following approval of the Jones-Connally Act, a cattle-adjustment program was formulated in conferences between officials of the Agricultural Adjustment Administration and a committee of producers, but before its final details could be completed, the rapid spread and increasing intensity of the drought and the undertaking of the cattle-purchase program in drought areas resulted in suspension of the proposed adjustment program.

In addition to making cattle a basic commodity, the Jones-Connally Act authorized appropriation of \$200,000,000 to aid in financing surplus reduction and production adjustments for the dairy- and beef-cattle industries, and to aid in supporting and balancing the markets for these industries. Of the authorized sum, \$100,000,000 was appropriated. The act provided that not more than 60 percent of the total of this sum was to be used for either industry. It further authorized the appropriation of \$50,000,000 "to enable the Secretary of Agriculture to make advances to the Federal Surplus Relief Corporation for the purchase of surplus dairy and beef products for distribution for relief purposes, and to enable the Secretary of Agriculture . . . to eliminate diseased dairy and beef cattle, including cattle suffering from tuberculosis or Bang's disease and to make payments to owners with respect thereto."

I. THE SITUATION AT THE BEGINNING OF 1934

The cattle industry sought aid through the powers of the Agricultural Adjustment Act when cattle prices declined during 1933 to the lowest point in the present century. This decline in price had ac-

accompanied a rapid increase in all cattle numbers since 1928. Low consumer income during 4 years of depression also had tended to depress cattle prices.

At the beginning of 1934 cattlemen found that since 1928 they had been producing annually from 1,000,000 to 1,500,000 more cattle than they had been marketing and that in the 6 years the total number of cattle in the United States had increased from 57,000,000 to more than 67,000,000, or nearly 20 percent.

Analysis of the situation revealed that the cattle industry was nearing the peak of the usual production cycle, which in the past had been about 15 years in length. The course of former cycles indicated that without some adjustment measure to check the continued increase in production, cattlemen would be likely to experience several more years of drastically low prices.

TIME OF LIQUIDATION WAS NEAR

Slaughter in the 1928-34 period had averaged about 21,000,000 head annually, but it was apparent that cattlemen could not much longer hold the accumulation of cows and breeding animals which had been built up during the depression. It was estimated that sale of these cattle would bring annual slaughter to approximately 24,000,000 head.

The situation was more serious because most of the increase in the number of cattle had occurred in cows and heifers. On January 1, 1934, the number of breeding cows on hand had risen to the largest figure in history. During the period of the increase, steers from the annual calf crops had been slaughtered at about the usual rates. Milk cows had increased 4,933,000 head in the 6 years or by about 22 percent of the 1928 milk-cow total. Cows and heifers not kept for milk production increased by the same percentage, from 8,765,000 head to 10,682,000 head.

The effect of the rapid increase was impressed upon cattlemen in 1933 by the level of the prices they received. The average farm price of beef cattle in 1933 was \$3.63 per hundredweight, which was the lowest price on record since 1899. The 1933 average farm price was \$2.05 per hundredweight below the fair-exchange value, based on pre-war price relationships. It was \$5.52 below the average price in 1929. The widest disparity in fair exchange and farm price of cattle was in December 1933, when the spread was \$2.91 per hundredweight. In this month of lowest prices, the slaughter of beef cattle under Federal inspection was the largest of any month since 1927.

THE CATTLE CYCLE

Although it was evident that a downward adjustment in cattle numbers would occur eventually, cattlemen knew that the inevitable period of liquidation and low prices would mean severe hardship for large numbers of producers. The cattle-production cycle usually runs about 15 years, 6 or 7 years up and 7 or 8 years down. Production usually starts to increase when prices of beef are high in relation to feed prices. After 6 or 7 years of gradual increase in cattle numbers, market supplies of cattle usually become relatively burdensome and prices decline until they are below their average relationship with prices of other livestock and feeds, when a contraction in numbers begins.

Even after the downward swing begins, it is 7 or 8 years before the trend runs its course, since that time is required to effect a substantial reduction in market supplies and to push cattle prices once more above their average relationship with prices of other farm commodities.

It was indicated that elimination of from 6,000,000 to 7,000,000 cows and heifers would be necessary to bring the cattle situation back into balance. It was considered, however, that removal of about 2,000,000 head of cows in addition to usual marketings through eradication of diseased animals and through relief purchases was all that should be undertaken in 1934.

PROBLEMS INVOLVED

The principal problems involved in sound adjustment of cattle numbers were:

1. How to remove the surplus cows and heifers from the farm and range without demoralizing the regular market for slaughter cattle.

2. How to secure agreements with individual producers and feeders to prevent the program of cow removal being counteracted by increases in numbers of heifer calves held back.

3. How to divide any benefit payments involved between those who grew the cattle and those who fattened them for marketing.

4. How to provide benefit payments promptly enough to aid cattlemen, since immediate adjustment in the number of breeding cows could not substantially affect the number of beef animals actually going to market before late 1936 and 1937. The problem was more difficult because of the large number of farmers who raised cattle. It was estimated that between 4,500,000 and 5,000,000 farmers kept some cattle.

II. THE COMMITTEE OF TWENTY-FIVE

In order to obtain a concensus on the advisability of a beef cattle production-adjustment program, representatives of the beef-cattle industry and of the Agricultural Adjustment Administration met and conferred in Chicago on April 26. At this conference, the significant facts in the cattle situation were discussed and methods of developing a program considered.

As a result of action at the Chicago meeting an advisory committee of 25 cattle breeders and feeders was named to work with the Adjustment Administration in developing and proposing an adjustment program to benefit the beef producers of the country.

This committee included representatives of every producing section of the country. The range men of the West, the breeders and feeders of the Corn Belt, and the producers of the East and South, had a voice in the development of the proposed national program.

RECOMMENDATIONS OF THE COMMITTEE

General recommendations for a cattle-adjustment program were worked out at various meetings of the Committee of Twenty-five and by a subcommittee of five during May.

The initial meeting of the Committee of Twenty-five was held in Washington May 9 to 12. The committee selected subcommittees on production and reduction control, on marketing, and on disease eradication and relief.

After drafting recommendations the Committee of Twenty-five appointed a subcommittee of five to continue to work with the Agricultural Adjustment Administration, and then concluded its sessions.

The subcommittee of five, after revising the suggestions of the Committee of Twenty-five, submitted a tentative program to the Agricultural Adjustment Administration and to the Secretary of Agriculture. This plan provided for a cow-reduction contract, a steer-and-heifer reduction contract, and for removal of excess cows and heifers through purchase for relief and in disease eradication. The aim of this program was a net reduction of 11 percent in cow numbers by January 1, 1937; stabilization of annual cattle marketings at near the 1928-32 level of 22,500,000 head; and the placing of benefit payments in the hands of cattlemen as early as possible.

By the end of May the drought had become much worse. The subcommittee of five met at Minneapolis on May 31. In addition to the subcommittee and representatives of the Agricultural Adjustment Administration, members of the Committee of Twenty-five from the more acutely affected drought areas were present.

DROUGHT CAUSED POSTPONEMENT

At this meeting the possibility of putting a cattle-adjustment program in operation was considered, but in view of the rapidly spreading drought, the committee recommended that initiation of the proposed program be held in abeyance pending the outcome of the drought.

Because of the continuing intensity of the drought and the subsequent cattle purchases in drought areas, the proposed control program was not put into effect during 1934.

A total of approximately \$118,600,000 was made available for payments to farmers for cattle bought in the drought-relief cattle-purchase program. Of this, approximately \$68,000,000 was from funds appropriated under the Jones-Connally Act, and approximately \$50,600,000 was from the emergency appropriation made by Congress when the drought became severe. In addition, of \$30,000,000 made available for the eradication of diseased cattle under the LaFollette amendment to the Jones-Connally Act, approximately \$8,000,000 had been expended or obligated on December 31, 1934.

III. THE OUTLOOK

The proportions of the cattle-purchase program carried on during 1934 far exceeded the scope of any cattle-reduction program that had been contemplated earlier in the year. Reduction of cattle numbers during the drought totaled approximately 10 million head, of which approximately 7,800,000 were accounted for by Government drought purchases, and about 60,000 head were disposed of through the disease-eradication program. This means that most of the increase from the low point of production in 1928 has been eliminated.

The elimination was greatest among cows and heifers, the classes of cattle where it was most effective from the standpoint of restoring a balance between production and slaughter. The proportion of cows and heifers in commercial slaughter was unusually large. This class constituted about 80 percent of the Government cattle purchases.

The distribution of the reduction in cattle numbers on a geographical basis was very uneven. Practically no reduction took place east of the Mississippi River. The concentration of reduction in the areas west of the Mississippi therefore resulted in a cattle

reduction for that section of the country of approximately 25 percent, while in some specific areas, as in the Dakotas the reduction was as much as 50 percent.

Aside from the benefit derived through bringing the number of cattle to a lower level, the cattle-buying campaign resulted in the elimination of large numbers of inferior cattle, and thus leaving on the farms cattle of a generally higher quality. Significant progress was also made in the removal of diseased cattle.

HIGHER PRICES IN PROSPECT

The changes which have occurred in the supply of cattle are expected to result in materially higher prices for cattle throughout 1935. It is anticipated that there will be a material increase in the demand for cattle, both for breeding and feeding purposes.

Although drought purchases accomplished much toward balancing cattle supplies with feed supplies and removing the surplus of breeding stock, the higher prices of cattle and probable increases in feed supplies in 1935 may easily result in the initiation of another major upward swing in cattle production. Because the number of cattle has been reduced, and because the powers of the Agricultural Adjustment Act are now available to cattle producers, the latter are in position to develop a program for preventing another over-expansion of their industry.

When the consequences of the drought are definitely and finally determined, consideration will be given to the advisability of an adjustment program for cattle, but in determining what action, if any, will be taken, the Agricultural Adjustment Administration will continue to be guided largely by the proposals of cattle producers.

CHAPTER 10

RICE

SALIENT FACTS ABOUT RICE ADJUSTMENT

1. Growers affected by rice agreements.....	11, 000
2. Allotted acreage under rice program in 1934..... acres..	743, 500
3. Acreage in rice production in 1934..... do.....	781, 000
4. Production quota under rice program in 1934..... bushels..	34, 084, 000
5. Production of rice in 1934..... do.....	38, 296, 000
6. Excess of production over quota in 1934..... do.....	4, 212, 000
7. Farm value of rice crops:	
As of December 1932.....	\$16, 116, 000
As of December 1933.....	\$28, 881, 000
As of December 1934.....	\$29, 662, 000

While rice was designated a basic commodity under the Agricultural Adjustment Act, the Administration, upon the request of the industry, decided to adjust supplies and promote higher prices through the medium of marketing agreements rather than by a production-adjustment program financed through processing taxes.

This decision was based on certain considerations with regard to the rice industry. Production is relatively compact geographically. There are definite channels through which the commodity is handled. And, in the case of the California growers and millers at least, there had been previous cooperative experience. These are general considerations basic to the use of marketing agreements for any commodity.

Rice, however, is grown in two distinct areas in the United States: In California, and in a group of southern States, Arkansas, Louisiana, and Texas. Conditions differ greatly in the two areas, and this fact must be kept in mind in reviewing the operations of the marketing agreements during the past year.

For example, the majority of growers and millers of rice in the southern group of States had had little experience in cooperative action previous to the agreements. As the force of this fact became more evident, there arose serious question as to whether the method of marketing agreements was the best method possible for handling the rice industry, at least in the southern area.

Nevertheless the agreements, both for the southern group of rice-producing States and for California, were effective in controlling acreage in production and in maintaining higher prices to rice producers during the past year.

NEED OF A RICE PROGRAM

The important consideration pointing to the need of a rice program was that, as a result of increased production and reduced outlets, the domestic carry-over of rice increased from 81,000,000 pounds in 1930 to 116,000,000 pounds in 1931, and to the unprecedented total of 220,000,000 pounds in 1932, when prices dropped to ruinous levels.

Because of curtailed production due to the low prices of the previous year and unusually unfavorable weather conditions affecting the 1933 crop, the carry-over fell back to 148,000,000 pounds in 1933. This remained the second largest carry-over on record, and without a program would undoubtedly have continued to depress the market. The fact that the domestic and territorial demand for rice is relatively inelastic impressed further the need for some method of regulating marketing conditions and adjusting production to actual outlets.

PROVISIONS OF THE CALIFORNIA AGREEMENT

The California agreement, which became effective September 26, 1933, may be taken as representing the general plan of both agreements. Its principal provisions were:

- (1) Agreement by the millers to pay minimum prices to rice growers, as set by the Secretary of Agriculture.
- (2) Agreement by the millers to a certain conversion charge and other fixed charges.
- (3) Agreement by millers and growers to participate in a plan of production control on the basis of past production, compliance to be rewarded by a pro rata sharing of a trust fund.

The mechanics of the production control plan (as amended for California in March 1934) were as follows:

Millers paid 60 percent of the minimum amount set by the Secretary, to growers on delivery of their rice, and set aside 40 percent for a trust fund.

All growers who proved to have cooperated in planting no more than their allotted acreage participated later in the distribution of the trust fund, on a pro rata basis.

Growers who had not cooperated, or had planted more than their allotted acreage, received no share of the trust fund.

Parties to the California agreement were the Secretary of Agriculture, the rice millers of the area, the Rice Growers' Association of California, and the Independent Rice Growers' Committee. In the case of this agreement, a resale price of \$3.60 per hundred pounds of clean Extra Fancy Japan rice at San Francisco was set by the Secretary, and the producers' price was arrived at by deduction of the conversion charge and certain other fixed charges. The grading of rice and the administration of the production-control program were handled by the administrative board set up under the agreement.

THE SOUTHERN AGREEMENT

While the provisions of the Southern agreement were roughly similar to those of the California agreement, there were a number of differences between the two, and in the case of the Southern agreement, certain changes were effected during the year which altered the provisions drastically.

The parties to the Southern agreement were the Secretary of Agriculture and rice millers of Arkansas, Texas, Louisiana, and Tennessee.

The production-control plan had not been included in the original agreement of October 1933. This plan, however, was introduced into the agreement on March 6, 1934.

As the agreement stood at this time, it contained the following provisions:

- (1) A schedule of minimum prices to producers based on \$3.15 per barrel for Prime A milling quality Blue Rose rice.
- (2) A minimum sales price representing the producers' price plus a conversion charge of 70 cents, plus a marketing-fund assessment of 10 cents.
- (3) The crop-control plan, involving a 20-percent reduction from the 1929-33 average.

It may be noted that the method of fixing prices for the Southern agreement differed from that of the California agreement in that in the South the fixed charges were added to the producer's price, while in the case of the California agreement, a resale price was set from which similar charges were deducted. It should also be noted that in the case of the California agreement, compliance of mills was obtained through a provision of liquidated damages against violators, while in the case of the Southern agreement there was no such provision.

Certain changes were made in the Southern agreement during the year. Amendments and orders of the Secretary of Agriculture in 1934 required compulsory grading of rough rice and divided the 10-cent marketing charge into 5 cents for advertising and 5 cents for administrative charges. The conversion charge was reduced to 50 cents, and the producers' base price was raised 15 to 20 cents per barrel. A millers' advisory council and a producer's committee were provided for, to cooperate in solving problems relating to operations of the agreement.

The chief change that was made in the southern agreement during the year, however, was the modification by administrative order on September 17, 1934, of the basis of payments into the trust fund.

NEARLY UNANIMOUS ACCEPTANCE AT OUTSET

Acceptance of the rice programs, at the outset, was almost unanimous. In California, 100 percent of the millers signed the agreement, and 98 percent of the growers cooperated in the production-control program. In the South, where conditions were more varied, approximately 95 percent of the growers cooperated in the production-control program, and 94 percent of the millers signed the marketing agreement. About 1,000 growers in California and about 10,000 growers in the Southern States were affected by the marketing agreements.

The agreements went into effect too late to exert control over production in 1933. As it turned out, the necessity for control of production proved to be less urgent that year because of the short 1933 crop, which was restricted both by unfavorable weather and by the fact that growers, responding to the low price level of 1932, planted a smaller acreage. Production in 1933 totaled 35,600,000 bushels, as compared to an average of 42,800,000 bushels in the 5 years previous.

While the agreements did not affect production for 1933, rice growers were benefited by them through increased prices for their crops that year. In accordance with prices established in the agree-

ments, growers received an average of \$2.74 a barrel for rice during the 1933-34 marketing season. This was an advance of \$1.25 per barrel over the 1932-33 level, which had been extremely low. Total cash income from rice to growers in 1933 is estimated at \$26,363,000 as compared with \$16,140,000 in 1932, an increase of more than 63 percent.

OPERATION OF THE CALIFORNIA AGREEMENT IN 1934

The California rice agreement was carried out in 1934 largely as originally planned. As provided in the agreement, probable production for the year was appraised by the crop board, through a survey of intentions-to-plant on the part of growers. This survey indicated a capacity for rice production of 3,090,000 bags for the 1934 season.

Since the agreement authorized production control when more than 3,000,000 bags were indicated, a reduction program was planned which would curtail production by 90,000 bags. This amount of reduction, translated into acreage, was prorated among producers on the basis of their average production during the base period, 1929-33, inclusive.

Few difficulties were encountered in carrying out this program in California. Growers complied almost unanimously in the control program, and received approximately 50 cents per 100 pounds of rough rice from the trust fund for compliance, besides the original payment.

OPERATION OF THE SOUTHERN AGREEMENT IN 1934

A number of problems arose, however, in connection with the Southern agreement. While 94 percent of the southern millers signed the agreement, the fact of a noncooperating minority of 6 percent made it seem advisable to issue licenses to all millers, in order to assure control over this minority. A license, therefore, was issued in October 1933, and was amended from time to time thereafter.

On March 6, 1934, crop-control provisions were introduced into the agreement, involving a reduction of 20 percent from the 1929-33 average in acreage planted. Cooperation was to be secured through pro rata payments from a trust fund, as described previously. However, it was not legally possible to include these crop-control provisions in the license. Consequently, while the millers who had signed the agreement were obliged to make a 60-percent payment to growers on delivery of rice, and to put the remaining 40 percent into a trust fund handled by the Secretary, it was mandatory for nonsignatory millers to pay 100 percent immediately upon delivery of rice.

The fact of this differential between signatory and nonsignatory mills resulted in a number of new mills appearing in the South, swelling the total of millers who had not signed the agreement. The increased problem raised by these new mills caused signatory millers to be doubtful of the entire program, so that between March and July of 1934 there was indecision as to whether the agreement should be continued or terminated. The agreement was not terminated, but in July it was considerably revised.

NONSIGNATORY MILLERS HAD ADVANTAGE

The advantage of nonsignatory millers, however, in being able to pay the full price immediately upon delivery of rice was further accentuated by the attitude of persons holding liens on growers' rice. Lien holders were reluctant to waive their interests in the rice crop until such time as full payment would have been made.

As a result of these disruptive influences, it became necessary on September 17, 1934, to modify the vital clause of the control plan providing for deferred payment of 40 percent from the trust fund. This modification provided that growers with quotas could receive 100-percent payment from all mills upon delivery of rice, receiving therefor certificate of sales. On December 21 an amendment to the agreement further modified its provisions so that growers without quotas could also receive full payment on delivery.

RESULTS OF THE 1934 AGREEMENTS

While the delays and changes in the southern agreement made it impossible for growers to sign contracts before the rice crop was planted, nevertheless, in anticipation of the control program, the majority of growers had actually planted according to their allotments, although in response to higher prices growers would have greatly expanded their acreage had it not been for the program. The effect of the program was a control of production which approximated the intention of the agreement.

How nearly this desired result was obtained may be indicated by comparing allotments with the total acreage planted. Allotments totaled 638,850 acres, and the acres actually planted, in the southern region, according to crop estimates of December 1934 totaled 676,000 acres.

Actual production also approximated the quotas originally determined, though an unusually favorable season resulted in high yields per acre. Quotas totaled 27,418,000 bushels, while the southern yield is estimated at 30,631,000 bushels.

In general the goal of the Administration's program—to hold production of rice to an allotted acreage and an estimated production in order to maintain satisfactory prices to growers—was approached closely as shown in table 38.

TABLE 38.—Data on allotments and production of rice in 1934 by States

State	Allotted acreage	Acreage in production	Quota	Produc- tion	Excess produc- tion
	<i>Acres</i>	<i>Acres</i>	<i>1,000 bushels</i>	<i>1,000 bushels</i>	<i>1,000 bushels</i>
Arkansas.....	135,000	136,000	6,650	6,936	286
Louisiana.....	361,000	394,000	13,562	15,957	2,395
Texas.....	142,500	146,000	7,206	7,738	532
California.....	105,000	105,000	6,666	7,665	999
Total.....	743,500	781,000	34,684	38,296	4,212

The Adjustment Administration is working out a new program for 1935-36. Meanwhile the excess production in 1934, of about 4,200,000 bushels of rice, presents a problem. Available domestic and

territorial markets absorb about the same amount of rice each year, irrespective of price. The possible solutions of the problems are export of excess rice, purchase for distribution through relief channels, or other outlets than the regular commercial channels.

PRICES AND INCOME TO GROWERS

A comparison of prices for the past 3 years provides an interesting index of the effectiveness of the agreements. Other factors than production control and marketing agreements, of course, entered into the price rise, but the activities of the Agricultural Adjustment Administration also have had a considerable effect.

In 1932-33 the average price of 100 pounds of extra fancy California-Japan rice at San Francisco was \$2.40. In 1933-34 the price was \$3.75 and in the current year, 1934-35, it is \$3.78. Extra fancy Blue Rose at New Orleans averaged \$2.25 in 1932-33, while in 1933-34 it was \$3.85, and for the present season it is \$3.75. The farm price of all grades and varieties of the 1933-34 crop averaged 78 cents a bushel, or nearly twice as much as the 1932-33 farm price. For 1934-35 the farm price also averaged 78 cents a bushel.

According to crop estimates of December 1934, the total farm value of rice for 1934 was \$29,662,000, as compared with \$28,881,000 for 1933 and \$16,116,000 for 1932.

PLANNING A PROGRAM FOR 1935

The chief objective of a rice program is the enhancement of returns to growers. This objective can be attained through regulation of milling and marketing conditions coupled with adjustment of production to actual demand. The experience of the last 15 months indicates that growers of rice and the industry as a whole obtained considerable benefits through the program.

There is little doubt that growers desire to participate in some plan for 1935 which, through adjusting production and regulating marketing conditions, would continue the maintenance of price, and that they do not desire to return to the planless operations of earlier years.

However, it would seem advisable that a production-adjustment program, independent of a millers' agreement, be effected directly through contracts with growers.

Such an arrangement points naturally to a production-adjustment program financed by processing taxes, of a type similar to the programs for other basic crops. Since rice was designated a basic commodity in the Agricultural Adjustment Act, this kind of program is already possible under the law. Officials of the Administration, growers, and members of the rice industry have been formulating the details of such a program for 1935.

CHAPTER 11

PEANUTS

SALIENT FACTS ABOUT ADJUSTMENT OF PEANUTS

1. Estimated total diversion and adjustment payments under 1935 program.....	\$5, 000, 000
2. Processing tax rate, per pound, at farmers' stock weight.....	cent 1
3. Benefit payments:	
Rate per ton on 1934 crop harvested on farm under contract..	\$8
Minimum payment per acre on allotted acreage.....	\$2
4. Percentage of 1933 or 1934 acreage grower may plant under 1935 contract.....	90
5. Rate of diversion payments per ton to producers for diverting up to 20 percent of 1934 crop to feed or oil:	
Virginia type peanuts.....	\$20
Spanish type peanuts.....	\$15
Runner type peanuts.....	\$10

There are approximately 325,000 commercial peanut growers in the United States. Forty-five percent of the commercial crop is produced in the Virginia area, which includes the States of Virginia, North Carolina, and Tennessee. The southeastern area, which includes South Carolina, Georgia, Florida, Alabama, and Mississippi, produces approximately the same percentage of the total commercial crop as is produced in the Virginia area. The southwestern area, which includes the States of Texas, Oklahoma, Arkansas, and Louisiana, produces normally about 10 percent of the total commercial crop.

The farm prices of peanuts have been considerably below parity in recent years. Since 1929 the purchasing power of prices to producers has ranged from 50 to 80 percent below the parity level. Although prices to producers were appreciably higher for the 1933-34 crop than for the preceding crop, they were still only 50 percent of parity. Peanut prices to producers during 1933-34 would have had to average 5.6 cents a pound in order to equal parity levels of 1910-14, whereas the actual price was only 2.8 cents a pound.

I. MARKETING AGREEMENT AND LICENSE FOR MILLERS

Because of the ruinously low farm prices during the 1931-32 and 1932-33 seasons and the early part of the 1933-34 season, a marketing agreement and license for peanut millers were developed under the authority of the Agricultural Adjustment Act. This agreement and license contained a schedule of minimum price and other provisions highly beneficial to growers.

⁶ Average of both years or 90 percent of 1.

ESTABLISHED MINIMUM PRICES

The agreement established minimum prices for farmers' stock peanuts, to be paid to producers by the millers, at \$65 a ton for the Southeastern and Virginia Spanish types; \$60 a ton for the Southwestern type and the Virginia Shelling basis, and \$55 a ton for the Southeastern Runner type. The difference between these prices was due primarily to meat content, quality, and trade preference. The agreement also provided for mandatory adherence to standard United States peanut grades.

The marketing agreement and license for peanut millers became effective on January 27, 1934, and while the marketing season was already well advanced on that date, anticipation of the effects of the agreement already had been reflected in higher prices. It is estimated that the marketing agreement resulted in returns to growers from the 1933-34 crop at least 30 percent larger than would otherwise have been the case.

At the time the marketing agreement and license for peanut millers became effective, peanuts were not a basic commodity and, therefore, individual growers were not parties to the agreement, which for the same reason contained no provision for production control.

FARMERS TURN TO "CONTRACT SHELLING"

When the millers, pledged to pay fixed minimum prices, felt they could not dispose of peanuts upon the market, they stopped buying them. The farmers then turned to "contract shelling" as a method of disposing of their crop. Under this method, the grower retained title to the peanuts and paid the miller on contract for his services in milling and shelling the crop. The grower was then free to sell under the established minimum prices, which were based on farmers' stock, or unshelled peanuts, without regard to the provisions of the marketing agreement. This situation was one of the chief reasons why a majority of the millers declined to continue the marketing agreement for the 1934-35 crop.

II. ADJUSTMENT PROGRAM

In the meantime, however, peanuts had been made a basic commodity and the Adjustment Administration, on September 29, 1934, announced an adjustment program designed to bring supply into line with consumption by diverting a portion of the 1934 crop into oil or feed for livestock and by limiting acreage in 1935. The marketing agreement and license were terminated, as of October 1, 1934, in accordance with the provisions which the agreement contained requiring termination upon the request of 75 percent of the contracting millers.

PRICES HAVE BEEN MAINTAINED

Under the adjustment program, market prices for the 1934 peanut crop have been maintained above \$60 a ton, for Spanish and Virginia type peanuts, and above \$50 a ton for Runners. In addition, producers who sign and carry out agreements to adjust 1935 peanut acreage will receive benefit payments. The amount of the benefit payment under each contract will be measured by the quantity of

peanuts harvested in 1934, on the farm covered by the contract, and will be at the rate of \$8 per ton, with a minimum payment in all cases of \$2 for each acre of the acreage allotted for 1935.

ACREAGE TO BE REDUCED IN 1935

Adjustment of peanut acreage in 1935 will be brought about through contracts with individual growers to plant in 1935 an acreage of peanuts not more than: (a) 90 percent of the acreage planted in 1933; or (b) 90 percent of the acreage in 1934; or (c) the average acreage planted in 1933 and 1934.

This choice of three methods of determining allotted acreage makes the contract flexible enough to fit satisfactorily the different conditions on different farms. Benefit payments for making this adjustment will be made only on peanuts harvested in 1934, and will not include peanuts hogged down or left in the ground. The payments will be made after the 1935 acreage is checked and the producer has complied with his contract.

The program is designed not only to adjust the acreage planted to peanuts in 1935, but also to adjust the supply of peanuts from the 1934 crop available for cleaning and shelling to a quantity which will be used by the cleaning and shelling trade at prices no lower than the current average farm price as of October 1, 1934.

PAYMENTS ENCOURAGE USE FOR OIL AND FEED

In order to make this adjustment the use of peanuts for oil and as feed for livestock has been encouraged. Enough of the 1934 crop has been or will be diverted to these uses so that growers can sell what is left, for cleaning and shelling, at satisfactory prices.

One phase of this plan is available only to growers who sign production-adjustment contracts. Each signer is eligible to receive payments for diverting up to 20 percent of his 1934 crop to oil or livestock feed, but diversion is not required under the contract for acreage adjustment and the diversion payments are in addition to the benefit payments for acreage adjustment. The rate of the diversion payments made directly to contracting growers is \$20 a ton for Virginia type peanuts, \$15 a ton for Spanish, and \$10 a ton for Runners. Diversion payments to contracting growers will be made at the same time as the payments for adjusting 1935 acreage.

Payments for diversion to oil are made on peanuts sold by the producer to an oil crusher, under an agreement signed by the oil crusher to whom the peanuts are sold, to use the peanuts only for oil.

Payments for diversion to feed are made on peanuts baled without being separated from the vines and either used or sold for feed under regulations approved by the Administration.

Contracting growers, who elect to participate in the diversion plan, are not paid for diverting more than 20 percent of their crop, although they may, if they choose, divert a larger proportion.

ANY GROWER ELIGIBLE FOR PAYMENT

Any grower, whether he has signed an acreage-adjustment contract or not, may participate in another phase of the diversion plan, which operates through agreements with manufacturers of peanut oil.

Payments to oil manufacturers, under this arrangement, are passed on to the growers in higher prices. These payments were made at rates representing the difference between the value of peanuts for oil and the price which the program was designed to establish as a minimum price to growers. Payments were offered on all 1934 farmers' stock purchased after October 1 and crushed for oil, except those peanuts for which diversion payments are to be made directly to the grower.

If the oil miller purchases peanuts from the contracting grower under a written agreement to use them for oil, the diversion payment goes directly from the Agricultural Adjustment Administration to the grower and not to the crusher; whereas, on farmers' stock peanuts purchased from any person without such an agreement, payments for diversion go to the oil miller, who is thus enabled to pay a higher price for peanuts purchased without a diversion agreement than he pays for peanuts purchased under such an agreement, while the grower receives the full return for his crop directly from the miller.

III. PROCESSING TAX

It is estimated that payments to growers under the diversion and adjustment plans will total more than \$5,000,000. In order to finance this program, a processing tax of 1 cent a pound, farmers' stock weight, was levied on peanuts, effective October 1, 1934. Levy of the tax was suspended on peanuts used in the manufacture of peanut oils. The processing tax is levied on the first domestic processing of peanuts, which is defined as the "cleaning, polishing, grading, shelling, crushing, or other processing thereof."

TAX IS LOWER THAN STATUTORY RATE

The rate of 1 cent a pound is only a little more than one-third of what would have been the full statutory processing tax on peanuts as calculated under the terms of the Agricultural Adjustment Act at the time the tax was levied. The full statutory rate then would have been 2.8 cents a pound, which is the difference between the current average farm price of 2.8 cents a pound and the fair exchange value of 5.6 cents a pound. The Secretary found, however, after investigation and public hearing, that the full statutory rate would cause such reduction in the quantity of peanuts, or products thereof, domestically consumed, as to result in the accumulation of surplus stocks of peanuts, or products thereof, or in the depression of the farm price of peanuts and that a rate of 1 cent a pound would not cause such results. Hence the 1-cent rate was established.

TAX SUSPENDED ON PEANUT OILS

On testimony presented at these hearings, it was also determined that peanut oils, a class of peanut products, are of such low value, considering the quantity of peanuts used in their manufacture, that the levy imposition of the processing tax would prevent in whole, or in large part, such use of peanuts and would thereby substantially decrease consumption and increase the surplus of peanuts. Accordingly, the processing tax on peanuts and peanut products used for manufacturing peanut oils was suspended.

ESTIMATED RETURNS TO GROWERS HIGHER

Estimates of the Bureau of Agricultural Economics, Department of Agriculture, indicate a 1934 crop of approximately 1,071,000,000 pounds of peanuts to be harvested for nuts. The estimated production is 14 percent larger than the 1933 crop, about 16 percent above the average production of the 5 years ended with 1931, and only about 4 percent smaller than the large production of 1931, when prices averaged about one-half those of the current season. The returns to peanut growers this season are expected to exceed 35 million dollars, as compared with 23.5 million dollars for the 1933 crop and 16 million dollars for the 1932 crop.

CHAPTER 12

OTHER BASIC COMMODITIES

By amendment to the Agricultural Adjustment Act in April 1934 the Seventy-third Congress increased the list of agricultural commodities enumerated as "basic agricultural commodities" in the original adjustment act. Production-control agreements involving the levy of a processing tax and the making of benefit payments under contracts between individual growers and the Secretary of Agriculture, are possible only in connection with the commodities specified in the statute as "basic agricultural commodities."

Included in the amended list of basic commodities were: Flax, rye, barley, and grain sorghums. Up to the close of 1934, various economic and other factors had made it either unnecessary, undesirable, or impracticable to establish a production-control program, with processing taxes and benefit payments for each of these commodities.

FLAX

Flax was designated as a basic commodity by Congress on April 7, 1934. Some years previous to 1933 approximately 50 percent of the domestic crushings of flaxseed was of domestically produced seed and the other 50 percent was imported. During 1933, on account of the extremely short crop, domestic production represented only one-third of total crushings. The tariff of 65 cents a bushel probably is effective to the extent of 50 cents a bushel in increasing prices received by producers. The United States average farm price from July to November 1934 was about \$1.70 a bushel, about 80 percent of parity or 41 cents a bushel less than parity for the period.

The area seeded to flax in the United States in 1934 was about 1,499,000 acres, as compared with 1,704,000 acres for 1933 and a 5-year average, 1929-30 to 1933-34, of 3,151,000 acres.

The principal producing States in the past have been the four producing most of the hard spring wheat, Minnesota, North Dakota, South Dakota, and Montana. In this region flax has often been considered an alternative crop for wheat.

Growers have suggested that it would be desirable to adjust the acreage of this commodity so that domestic production will again be about one-half of domestic requirements. Such an adjustment would mean a considerable increase in acreage over the area planted in 1933 and 1934, but, until building activity increases, and consumption of linseed oil shows a corresponding rise, the desirable acreage might be somewhat less than the average for the 5-year period 1929-33.

The Agricultural Adjustment Administration is exploring this field. If a workable method can be devised so that, by making

benefit payments in connection with the flax production, the purposes of the act would be effectuated as to that commodity, the tentative plan will be given to growers and crushers for consideration. If benefit payments should be made with respect to flax, the processing tax levied by the act would become effective upon that commodity.

RYE

Rye was designated as a basic commodity by Congress on April 7, 1934. A relatively small proportion of the crop, however, is processed in the United States in the manufacture of flour and liquors.

Prior to 1929-30 the United States exported considerably more rye than was imported. From 1929-30 to 1932-33 the net exports were considerably reduced. During the marketing year 1933-34 the net imports amounted to about 12,000,000 bushels, and it is possible that about this same quantity may be imported during 1934-35.

Of about 12,000,000 bushels imported by the United States during the 1933-34 crop season, 5,251,000 bushels were from Poland. Polish rye came into the country over a tariff of 15 cents per bushel, which is the equivalent of 25 cents per hundred pounds. The duty on rye flour and meal amounts to 45 cents per hundred pounds.

The importation of Polish rye was the result of a combination of circumstances. In the first place, the imports were needed in the United States in order to make up for the deficiency in the 1933 crop, which was only 52 percent of the average production for the 5-year period 1927-31. Also an unusual situation existed in domestic rye and flour prices.

PRICES OF RYE IN UNITED STATES ARE HIGHER

Normally, rye prices in the United States are well below prices in European countries and about the same as those in Canada and Argentina. But recently, because of the short rye crop, monetary factors, and an increased use of rye in the United States, rye prices in the United States maintained a level well above those of Canada and Argentina.

Furthermore, in an effort to create a favorable balance of trade, Poland has since 1926 stimulated increased production of rye, the main crop of that country, and since 1929 has had a surplus available for export. Through bounties to producers, and premiums to exporters, the movement of this exportable surplus into world trade channels has been accomplished. This world trade in Polish rye was diverted toward the United States in the fall of 1933 as a result of these conditions. United States importation of Polish rye enabled Poland to purchase large quantities of American goods, principally cotton, which enjoys exemption from restrictive import quotas established by Poland.

It should be noted that despite whatever depressing effect the Polish imports may have had, and despite greatly decreased production, the total farm value of the domestic rye crop increased from \$9,073,000 in 1932 to \$11,718,000 in 1933, and to \$12,182,000 in 1934.

QUESTION OF TARIFF WEIGHED

Under the existing laws relatively little could be done other than by new legislation to prevent importation of rye, and there is also the question of the desirability of measures to increase tariffs, when at the same time there is a movement to have tariff barriers lowered in order to encourage exports for products. The flexible tariff provision under which the tariff could be increased by 7½ cents per bushel could be applied only if it were found that the cost of production of rye in this country was that much higher than in Poland.

While such an increase in the tariff would tend to raise rye prices in the United States by the amount of the increased duty, it was believed that this would have little effect as to the quantity of rye imported, as there were large supplies of rye in Europe, and the prices of both wheat and rye were low in European markets.

The United States farm price of rye from July to November 1934 averaged 72.3 cents a bushel, which was 80 percent of parity or about 18 cents a bushel less than parity.

Much of the rye produced in the United States is cut for hay, although the amount varies considerably according to the season and the supply of other feeds. When other forage is plentiful or when the price of the grain is relatively high, growers harvest more of this crop for grain. Rye is not ordinarily produced on the same farm year after year, but is an occasional crop, particularly in the area where much of the United States crop is raised. For these reasons, farm allotments and acreage in connection with any adjustment program for rye would probably need to be determined by means other than a historical base.

No rye-adjustment program is contemplated for 1935, although this crop may be included in the programs for 1936, possibly in combination with other cash grains

BARLEY

Because barley is primarily a feed grain, an adjustment program for it could best be developed in conjunction with other feed grains. The average production for the 5-year period 1929-30 to 1933-34 was 248 million bushels, as compared with net exports of 9.5 million bushels for the same period. The average farm price for this 5-year period was 38.6 cents a bushel. The average farm price for the 5 months July to November 1934 was 69 cents a bushel, which was 89.3 percent of parity or 8 cents less than parity. Most of the exports from the United States are brewing barley shipped from California.

Prior to the 1930-31 crop year, little barley was imported into the United States. Total imports for 1930-31 amounted to 1,413,000 bushels. Imports during the 1933-34 crop year increased to 4,560,000 bushels, chiefly on account of the short crop in the United States.

Net exports declined from 24,013,000 bushels in 1929-30 to 1,552,000 bushels in 1933-34.

Since only a small portion of the barley produced is processed in the United States, the proceeds from a processing tax on barley would be relatively small. For the fiscal year ending June 30, 1934, malt used in the production of fermented and distilled liquors in the United States represented approximately 41,000,000 bushels of

barley. Of this amount 4,524,000 bushels is represented by imports of barley malt. Exports of barley malt represented 176,500 bushels of barley.

GRAIN SORGHUMS

Grain sorghums are a feed crop produced principally in Texas, Oklahoma, Kansas, and adjoining States. About 58 percent of the total acreage is harvested for grain and about 42 percent for forage. Very little of this commodity finds its way into domestic processing, although considerable quantities are marketed for feed purposes. Therefore, it would not be practicable to raise funds through a processing tax on this commodity. The average production of sorghums cut for grain during the 5-year period 1929-30 to 1933-34 was 56 million bushels. The average farm price per bushel for the same period was 89 cents a bushel. In terms of grain the 1934 crops of grain sorghums harvested for all purposes amounted to 35 million bushels as compared with a 5-year average 1929-30 to 1933-34 of 89 million bushels

CHAPTER 13

GENERAL CROPS

SALIENT FACTS ABOUT GENERAL CROPS ADJUSTMENT

1. Number of marketing agreements in effect for general crops, Dec. 31, 1934.....	23
2. Number of commodities affected by these agreements.....	27
3. Number of producers who produced these commodities in 1934.....	211, 400
4. Total farm value general crops affected by marketing agreements: In 1934.....	\$244, 266, 000
In 1933.....	196, 755, 000

The program of the Agricultural Adjustment Administration for improving the situation of producers of nonbasic agricultural commodities has consisted principally of the development and supervision of marketing agreements. This method has been followed because authority under the Agricultural Adjustment Act to deal with problems of production control through the benefit-payment method is limited to those agricultural products designated in the act as basic commodities.

Attack upon acute problems facing the many producers of various nonbasic commodities has therefore been made through marketing agreements between the Secretary of Agriculture and processors, producers, associations of producers, and others engaged in handling these commodities.

During 1934 a total of 17 marketing agreements relating to general crops became effective and 6 of the 9 marketing agreements which had become effective in 1933 were continued in operation. Three marketing agreements were terminated during the year. Two of these, affecting California cling peaches and Florida citrus, were replaced by new agreements, while the other, affecting peanuts, was replaced by a production-control program. The 23 marketing agreements now in effect cover 27 commodities grown in 17 States by approximately 211,400 producers. (See table 38.) The total farm value of these commodities in 1934 amounted to \$244,266,000 as against a total farm value in 1933 of \$196,755,000.

COMMODITIES COVERED BY AGREEMENTS

Of the 23 marketing agreements now in effect, 14 relate to fresh fruits and vegetables, 3 to canned fruits and vegetables, 4 to dried fruits and nuts, 1 to gum turpentine and gum rosin, and 1 to package bees and queens. (See Table 39.)

TABLE 39.—*Marketing agreements in effect under General Crops Section and number of growers affected under each agreement, as of Dec. 31, 1934*

Marketing agreement	Number of growers affected	Marketing agreement	Number of growers affected
Cling peaches canned in California.....	3, 000	Fresh asparagus grown in California.....	3 400
Fresh California deciduous tree fruits, except apples.....	12, 000	Florida celery industry.....	400
Northwest fresh deciduous tree fruits ¹	75, 000	Package bees and queens.....	300
Walnuts in California, Oregon, and Washington.....	12, 000	California raisins.....	13, 500
Fresh California Tokay grapes.....	1, 600	California date shippers.....	200
California ripe olive canning industry....	1, 900	Potatoes grown in Southeastern States ⁴	3, 800
Citrus fruit grown in Florida.....	23, 000	Western Washington lettuce, peas, and cauliflower.....	1, 200
Oranges and grapefruit, California and Arizona.....	18, 000	Florida strawberries.....	1, 000
Oranges and grapefruit grown in Texas....	8, 300	California Gravenstein apples.....	1, 300
Gum turpentine and gum rosin processors.....	10, 200	Watermelons in Florida, South Carolina, North Carolina, and Georgia.....	10, 000
Asparagus canning industry, California area ²	3 400	Dried prunes produced in California.....	12, 500
		Fresh peaches grown in Colorado.....	400
		Total.....	211, 400

¹ Includes Washington, Oregon, Montana, and Idaho.² License requested by the industry in lieu of a marketing agreement.³ Growers of asparagus in California produce both for fresh market and for canning.⁴ Includes Florida, Georgia, South Carolina, North Carolina, Virginia, and Maryland.

Public hearings have been held on 22 proposed marketing agreements other than those now in effect. Of these, 8 were dropped after full consideration of all available evidence indicated that no practical program could be developed that would effectuate the purposes of the act; 10 were redrafted, tentatively approved by the Secretary, and forwarded to the industry for signature; and 4 are being considered by the Adjustment Administration.

Of the 10 marketing agreements which received tentative but not final approval in 1934, six were withdrawn, partly because of divergence of opinion in the industries, and partly because the large crops that were in prospect at the time when the agreements were tentatively approved, did not develop. The remaining four are now under consideration by the several industries.

NEED ACCOMPANYING LICENSE TO BE EFFECTIVE

Few marketing agreements can be effective without an accompanying license. Usually from 75 to 95 percent of the handlers voluntarily sign marketing agreements and agree to be bound by their terms. A small minority, however, usually refuses to cooperate voluntarily in the program agreed upon by the large majority.

A license embodying the provisions of the marketing agreement, therefore, is issued by the Secretary of Agriculture to all handlers, in order to prevent a minority from rendering the program ineffective. Experience has demonstrated that the control of surpluses, regulation of shipments, and the maintenance of minimum prices can seldom be long continued by less than 100 percent of the industry.

I. SITUATIONS IN WHICH MARKETING AGREEMENTS ARE FEASIBLE

Improvement of the income of producers is the primary objective sought through marketing agreements and accompanying licenses placed in effect for specialty crops by the Secretary of Agriculture.

Unlike the adjustment program for basic commodities, this method does not provide for immediate assistance to growers of specialty crops through benefit payments obtained from processing taxes. The principle type of adjustment in the basic-crop program is the adjustment of production; whereas the adjustment sought through marketing agreements is intended to prevent unduly low returns to producers after the crop is mature and ready for market. The marketing agreements assist growers either through effecting an increase in the producer price or in maintaining a price which would otherwise decline.

LOCALIZED PRODUCTION IMPORTANT

Marketing agreements and licenses are most adapted to those types of specialty crops whose production is geographically localized and whose market outlets and methods of marketing are well defined and lend themselves to control. A relatively small number of producers and handlers and the presence of strong cooperative marketing associations facilitate the adoption and execution of agreements.

An outstanding example of an industry with such characteristics is the California orange industry. As contrasted with agreements involving commodities of this type it is extremely difficult to develop and operate an agreement for a commodity such as dry edible beans, which are produced in widely separated areas and for which marketing methods are not uniform.

MEMBERS OF COOPERATIVES ARE MOST CAPABLE

Producers in areas in which cooperative marketing has made considerable progress have generally proven the most capable of participating in and cooperating through marketing agreements. Their knowledge of the marketing problems and the advantages to be gained from attacking these problems on a united basis has stimulated an understanding of the requisites to successful group action that are so essential to operating under a marketing agreement.

Marketing agreements to date have been used primarily in emergency situations; that is when prices to growers have been at distressingly low levels. That properly constituted marketing agreements can be a powerful force in alleviating such acute situations in many specialty crops is a demonstrated fact. The place of marketing agreements in a long-time program of agricultural adjustment, however, is bound up with the central problems of marketing costs and distribution technic. If the aim is to develop marketing agreements to be operated continuously on most special commodities, it evidently will be necessary (1) to develop methods for maintaining a check on production; (2) or to make distributing margins flexible, with large volumes, so that farmers would get a reasonable return for large volume instead of taking the large losses which they now suffer; or (3) to develop methods for expanding markets to balance increased production.

II. MEANS EMPLOYED IN MARKETING AGREEMENTS TO INCREASE FARM INCOME

Increased returns to producers are sought under marketing agreements by various means. In each agreement the aim is to develop means best adapted to the particular commodity and situation under consideration. Some form of volume regulation is most common. In many agreements volume regulation is supplemented by quality regulation or minimum prices, or both.

LIMITATION OF TOTAL VOLUME MARKETED DURING THE SEASON

One means employed in several marketing agreements to increase returns to producers is control of the season total of market supplies. The volume that it is advisable to market is determined just before harvest. Marketing agreements and licenses that regulate supply in this manner are those applying to California clingstone peaches used for canning; California asparagus used for canning;⁷ California Gravenstein apples; gum turpentine and gum rosin processed in the Southern States; and early potatoes produced in the Atlantic Coast and Southern States.

In the case of potatoes the volume to be marketed may be changed from time to time. The quantity of gum turpentine and gum rosin and of Gravenstein apples may be increased but not decreased. In the case of raisins, prunes, walnuts, and ripe olives, provisions are made for limiting the percentage of the total crop which may be marketed in commercial channels. This percentage may be increased if market conditions justify.

Limitation of the total volume marketed during the entire season is based on the expectation that the total returns to producers for the limited volume will be greater than would be the case if all of the available supply were marketed. Returns to growers can be increased by restricting the total supply marketed during years when crops are large in relation to the level of consumer income, provided the demand in the producers' market is inelastic, and small changes in supply marketed result in a large change in the price to growers.

INELASTIC DEMAND IS FACTOR

Prices to producers usually behave in this manner if the consumer demand for the commodity is inelastic or the market charges are a large proportion of the price paid by the consumer. For example, the demand for early potatoes in both the consumers' and producers' market is inelastic.

Among the commodities for which marketing charges are high are those which need to be processed, such as fruits used for canning. These charges are not only high but tend to remain relatively fixed. A marked decline in the price of the finished product, therefore, may result in eliminating entirely any return to the producer for the raw fruit.

Clingstone peaches at \$30 a ton ordinarily represent less than one-fifth of the price paid by consumers for the equivalent amount of canned peaches. A 10-percent change in the price paid by consumers for canned peaches is generally accompanied by more than a 50-percent change in prices received by producers.

⁷ License only, in lieu of a marketing agreement.

During the 1934 season the total crop of cling peaches amounted to 324,000 tons, of which approximately 275,000 tons were No. 1 fruit. The agreement and license fixed the total tonnage which growers could sell to canners and which canners could pack at 201,000 tons. Growers received an average of \$30 a ton, or total returns of over \$6,000,000. Had no restriction been placed upon the tonnage that canners could purchase from growers, it is estimated the total return to growers would have been only one-half the amount actually received.

PRICE MUST EXCEED MARKETING CHARGES

High marketing charges are also characteristic of fruits and vegetables marketed in fresh form but produced far from their markets. Prices in the consumers' markets must exceed the packing, transportation, and selling charges before producers receive any return.

For example, it costs approximately \$1.20 to transfer a box of Gravenstein apples from trees in California to the wholesaler in New York. If the supply of Gravenstein apples shipped to the eastern markets is such as to bring about a wholesale price less than \$1.20 a box, producers get nothing whatever for producing the apples. Prices above \$1.20 a box are reflected back as positive returns to producers. Thus a change from \$1.20 to \$1.50 per box in eastern markets will mean the difference between no return and 30 cents per box to the grower.

PERIOD-TO-PERIOD PRORATION

Most of the marketing agreements relating to fresh fruits and vegetables contain provisions for regulating the total quantity shipped, from day to day or from week to week. This regulation of flow of total movement with respect to time is sometimes supplemented by control of the volume moved to specific markets.

Marketing agreements and licenses having period-to-period proration provisions include those for California fresh deciduous tree fruits except apples, California Tokay grapes, Florida celery, California fresh asparagus, western Washington vegetables, California and Arizona oranges and grapefruit, Northwest fresh deciduous tree fruits, Texas citrus fruit, Florida citrus fruit, Colorado peaches, California Gravenstein apples, and potatoes grown in the Southeastern States. Period-to-period volume proration is the principal marketing control provision in the case of the first six of these agreements, while each of the others provides for some additional means of control.

Alternate periods of short-time market gluts and market shortages result from unplanned shipments to market from a given area or from separated areas marketing the same commodity at the same time. If the rate of flow to market exceeds the rate of movement into consumption, supplies accumulate with drastic price declines resulting. Once prices have been broken as a result of such circumstances, a recovery is difficult to obtain. Even though the supplies be greatly reduced, prices often fail to respond promptly.

WHEN PRICE DECLINES BRING LOSSES TO OWNERS

During the recent years of reduced consumer-purchasing power, declines in price in wholesale markets have frequently resulted in losses to growers.

For example, during the months of October and November 1934, a period during which the marketing agreement was not in effect, over 10 percent of the entire quantity of Florida grapefruit sold at auction in New York brought prices below the inescapable cash costs incurred in moving fruit from the groves to that market, while on several days during this 2-month period, from 20 to 45 percent of the fruit was sold at prices below these costs.

Careful regulation of shipments in accordance with the demand in the consuming markets does not necessarily result in a reduction in the total supply marketed. On the contrary, evidence to date indicates that a larger total supply can be moved into consumption on a stabilized market than on a demoralized market. Under the marketing agreement for California summer oranges, shipments were so regulated as to provide ample supplies at all times without permitting accumulation of excessive supplies in any market. Prices of summer oranges in eastern markets were maintained at a stable level, the entire merchantable supply was moved into consumption, and returns to producers were materially above those of a year earlier.

SHIPPING HOLIDAY

Regulating quantity by means of a shipping holiday is employed only under the southeastern watermelon agreement. It provides that shipments of watermelons from the Southeastern States may be prohibited entirely for a period of not more than 48 consecutive hours and that such periods shall be not less than 5 days apart.

GRADE AND SIZE REGULATION

A number of the fruit and vegetable agreements include provisions intended to promote the handling and sale of these commodities on a quality basis. The quality regulations contained in these agreements usually include the applicable official grades where such have been promulgated by the United States Department of Agriculture, and the inspection of shipments by the Federal-State inspection service. In several of the industries concerned, official grades and standards and inspection have heretofore been used voluntarily by some members of the industry. Under an agreement which includes such quality regulations, the standardized grading procedure includes all shippers and applies to the industry as a whole.

Provisions on grading and inspection do not in themselves necessarily regulate the quantity shipped to market. Certain agreements, however, which include compulsory grade and inspection regulations, also provide for limiting shipments on a basis of grade, or size, or both.

Whenever it is necessary to limit shipments in order to avoid market gluts and ruinously low returns to growers, it is generally preferable from the standpoint of growers to apply such limitations to the least valuable portion of the available supply. During periods of market surpluses in many perishable crops, low-quality produce frequently fails to sell for enough to cover the actual expenses incurred in its harvesting and marketing.

IMPROVES MARKET FOR HIGHER QUALITY

Obviously, to prohibit shipments of inferior grades during such periods makes it possible for growers to avoid losses on this account, and to improve the markets for the higher quality.

Regulation of volume by means of grade and size restrictions is frequently the most feasible and effective form of quantity limitation. In the application of grade or size regulations, or both, the differences in the demand for specific grades or sizes occurring in the markets, and the variations among individual growers respecting the proportion of the several grades or sizes which each has produced, must be considered. The provisions are designed to prevent undue hardship on individual growers whose crops run heavily to inferior grades and undesirable sizes.

Marketing agreements for Florida and Texas citrus, Florida strawberries, and southeastern watermelons authorize prohibition of shipments of the least valuable grades or sizes, or both. The California cling-peach agreements provide that only No. 1 peaches may be canned, and the California prune agreement prohibits the sale by packers of off-grade prunes in regular commercial channels.

MINIMUM PRICES AND THE PROBLEMS THEY RAISE

The power to fix prices is the goal which many groups desire when initial consideration is being given to a marketing agreement. Growers are prone to insist that prices to them be fixed at a level that will assure them cost of production plus a profit, while handlers frequently request fixed resale prices as a means of securing a predetermined operating margin and a guaranty that their competitors will not be able to sell at a lower price than they.

The fixing of prices in marketing agreements creates many difficult economic and operating problems. At what level are prices to be fixed? How will fixed prices affect purchases by the trade? Are differences in prices to be permitted for variations in location with respect to the principal markets, for variations in quality, for variations in types of services performed, and if so, how are they to be equitably determined? If a handler's margin is to be fixed, should it be wide enough to include the cost of all handlers, the average cost, or only the cost of the most efficient? Is it economically desirable to freeze margins?

These questions with all their implications, as well as many more, must be confronted when it is desired to include prices in an agreement.

Because of these problems, for which no satisfactory solution has yet been found, minimum-price provisions are included in only those marketing agreements where volume regulation is either impracticable or cannot by itself effectively maintain prices to growers. Minimum resale prices are generally applied only to commodities of which a considerable proportion is marketed by the producers themselves, either individually or through cooperative marketing associations.

MINIMUM PRICES IN ONLY SIX AGREEMENTS

Minimum price provisions are included in only 6 of the 23 marketing agreements now covering nonbasic commodities. In the California raisin agreement, the minimum-price provisions relate to prices paid

growers, while in the California date, Pacific coast walnut, Northwest deciduous tree fruit, and package bee agreements they relate to handlers' selling prices. In the agreement for California ripe olives for canning, minimum schedules apply both to prices paid growers and to canners' selling prices. In each case the establishment of minimum prices has apparently contributed materially to the maintenance of a stabilized market. This has been particularly noticeable in connection with walnuts, canned ripe olives, and dates.

The marketing agreement for shippers and producers of fresh peaches grown in Colorado includes a provision for posting price schedules by shippers, and prohibits a shipper from quoting, offering for sale, or selling, peaches below his posted prices. The aim of this provision is to reduce the incentive for price-cutting at the expense of the grower which arises out of the desire of one shipper to secure the business that ordinarily goes to another.

CONTROL OF SUPPLY SHOULD ACCOMPANY MINIMUM PRICES

It is seldom feasible to include minimum prices in marketing agreements without control of the supply marketed. If the total available supply of a commodity is larger than the quantity that will be taken at the established minimum price—and this is frequently the case—failure to limit the supply to that quantity causes difficulty in maintaining the minimum price, and inequality among producers with respect to the available market.

Only two of the marketing agreements covering nonbasic commodities and containing minimum prices—those for package bees and queens and for dates—do not also contain provisions for regulation of the volume marketed. Since package bees and queens are seldom marketed by the producers except on advance orders, and since any quantities of package bees remaining unsold are retained in the colonies for honey production, measures for supply control appear unnecessary in this agreement.

III. ALLOCATING THE SUPPLY TO BE MARKETING

An important problem in effecting a marketing-control program that involves limiting the total season supply or the movement from period to period, or both, is that of assuring all growers and handlers an equal opportunity to market their equitable proportions of the total supply that it is deemed advisable to market.

The marketing agreement for handlers of fresh California asparagus provides that in order to improve returns to growers by adjusting the supply of asparagus to the market demand, the proration committee may from time to time institute the proration of shipments.

In instituting proration the committee determines: (1) The total quantity of asparagus which it deems advisable to ship in any period, and (2) the total quantity of asparagus which will be available for shipment in that period. If the total quantity available for shipment is greater than the total quantity that it is deemed advisable to ship, the committee allots to each handler a proportionate share of the latter quantity. This share is based upon the quantity which each handler controls. Each handler in turn divides his allotment among his growers in proportion to the available supply of each.

BASES FOR ALLOTMENTS

In the Florida citrus marketing agreement the basis for allotment to shippers during periods for which proration is in effect is either the quantity of fruit controlled by the shipper, or his current performance, depending on which rating is the higher. The current performance of the shipper is determined by taking his past performance during the two previous seasons, adjusting it to the current production of the State, and multiplying by the percentage of the total crop remaining to be shipped before the proration period.

The 1934 California cling peach agreement provides, by means of certificates issued to producers by the control committee for equitably allocating among the different producers, the limited quantity permitted to be canned. The control committee makes a survey to determine the probable total production of no. 1 cling peaches of each individual orchard and the combined probable total production of all orchards. The ratio of total production of all orchards to the total tonnage permitted to be canned is then applied to the estimated production of each orchard, and the resulting figure represents the deliverable tonnage for canning for each such orchard. The control committee then issues certificates to each grower for the amount of his deliverable tonnage for canning and no canners are permitted to receive for canning any cling peaches unless the peaches are accompanied by appropriate certificates.

PROVIDING FOR ADJUSTMENTS IN ALLOTMENTS

Allotments to processors of gum turpentine and gum rosin are made on the basis of their past marketings. Provisions are included for allotments to new processors and for adjustments in allotments to old processors if such adjustment is justifiable.

In agreements such as those for California raisins and prunes, and walnuts grown in California, Oregon, and Washington, each handler is required to turn over to the control committee a specified percentage of all receipts of the commodity from growers. This percentage expresses the ratio between the total quantity that it is deemed advisable to market in regular trade channels, and the total available supply, the current total production plus carry-over as in the case of walnuts, or the current production, as in the case of raisins and prunes.

IV. OPERATION OF MARKETING AGREEMENTS

Marketing agreements relating to general crops are administered by governing bodies, usually known as control committees. All actions of the control committees are subject to the approval or disapproval of the Secretary of Agriculture. A marketing agreement, however well drafted, can be operated most effectively only if administered by men well acquainted with the many problems of the industry concerned who have the interests of the growers uppermost in their minds.

The membership of the control committees of the first agreements put into effect consisted largely of handlers, but in the more recent agreements growers have at least equal representation with handlers. In the operation of marketing agreements designed to increase re-

turns to growers it appears sound policy for growers to have an important voice.

The general procedure is for the grower members of the control committee to be elected by the growers and for the handler members to be elected by the handlers. In order to avoid the expense of elections some of the earlier agreements permitted the selection of control-committee members by organizations not directly connected with or bound by terms of the marketing agreement, but this has proven unsatisfactory. Direct election of the handler members of the control committee by the handlers does not invoke particular difficulties, since the number of handlers is usually relatively small. Direct election of grower members by growers, however, is frequently cumbersome, particularly in those cases involving a large number of growers and extending over a wide territory. In cases where elections by growers do not appear feasible the best alternative yet found is selection of grower members by the Secretary of Agriculture.

FUNCTION OF FIELD REPRESENTATIVE

The operation of a marketing agreement offers an opportunity for a maximum of industry cooperation and a minimum of Government supervision. A field representative of the Adjustment Administration has been assigned to each agreement so as to maintain a direct contact with the agreement without assuming the direct responsibility for its operation. In this way it has been possible to assist in getting new agreements into operation with a minimum of confusion and misunderstanding and also to adjust differences and complaints with a minimum of delay.

The presence of such an Administration representative in the field has also done much to assure the entire industry that every effort is being made to obtain fair treatment to all parties. The effectiveness of this system of supervision is perhaps best illustrated by the fact that there have been in operation only four agreements under which more than two enforcement cases have been necessary.

The successful operation of control committees has been exceedingly difficult because of the lack of precedent for such activity. Most of the agreements have been completed just before the opening of the marketing season and in several cases after marketing had already begun. Frequently organization has been completed and the selection of a manager made under the most trying circumstances. Conscientious and unselfish service of committee members and untiring efforts of managers and organizations have largely been responsible for the success which has been achieved through the various agreements.

PROBLEMS OF HUMAN RELATIONS

The most difficult problems encountered in the operation of marketing agreements have not been those of an economic character, but problems of human relations. The committees chosen by those industries which had learned to cooperate on an industry-wide basis in the past have functioned effectively and with a minimum of differences. But in a few instances factionalism, which had largely been created by past differences, has been carried over into the operation of the agreement.

The enforcement of a license depends to a large extent upon the committee operating in full compliance with the provisions of the license. In some instances committees have disregarded this principle and have thus made it impossible for the Administration to enforce committee actions because these have been taken outside of the authorization of the license or have been invalidated by failure to adhere to the provisions of the license.

The degree of voluntary compliance with the provisions of agreements and licenses has been satisfactory and has greatly contributed to their effective operation. A number of agreements have been operated throughout an entire season without a single request for enforcement by the Administration. This cooperation can be attributed largely to a realization by all concerned that a marketing agreement and license provide a practical method for improving prices to producers and for handling other problems common to all individuals. The principle of endeavoring to secure compliance rather than to punish violators has been followed with distinct success.

ENFORCEMENT UNDER LICENSE PROVISIONS

The most common method of enforcement which has been followed has been that of administrative enforcement under the license provision of the Adjustment Act. This involves the issuance of an order to show cause why the license of an alleged violator should not be revoked, a hearing by a representative of the Secretary at which the alleged violator is given every opportunity to defend his actions, and a subsequent finding and order by the Secretary in accordance with the record of the hearing.

Up to December 31, 38 orders to show cause have been issued. Hearings have been held in 33 cases. Twelve are now awaiting decision by the Secretary. Of the balance, 8 licenses have been revoked, 5 suspended, and 3 licensees have been found guilty of serious violation and excluded from a subsequent license. Charges have been dismissed in 4 cases and action has been withheld in 3 instances on assurance of compliance. Compliance has also been secured in two cases through court injunctions.

V. CODES OF FAIR COMPETITION

Four codes of fair competition relating to general crops are now in effect. The fair trade practice provisions of these codes are under the supervision of the Agricultural Adjustment Administration. Other provisions of the codes, such as wages, hours of labor, and budget assessments, are under the supervision of the National Recovery Administration.

FRUIT AND VEGETABLE CODE

The code of fair competition for the fresh fruit and vegetable industry became effective July 16, 1933. It contains fair trade practice and credit provisions for the distribution of fresh fruits and vegetables throughout the country. Approximately 20,000 firms are affected by the code which offers a means of preventing disastrous price wars in the fruit and vegetable industry, and supplements the more direct influence of marketing agreements.

CODE FOR ANTI-HOG-CHOLERA SERUM AND VIRUS INDUSTRY

The code of the producers of anti-hog-cholera serum and hog-cholera virus became effective March 6, 1934, and affects about 50 producing concerns in an industry whose whole business is valued at approximately \$10,000,000 per annum. Serum and virus are manufactured under licenses issued by the United States Department of Agriculture, because the vaccines were a discovery of the Department. The code is designed to prevent destructive price wars which have been prevalent in the industry, and to provide consumers with adequate supplies of serum and virus during hog-cholera epidemics.

COMMERCIAL BREEDER-HATCHERY CODE

The commercial breeder and hatchery code became effective December 27, 1933, and affects about 13,500 hatcheries in the United States. It contains provisions prohibiting unfair trade practices such as destructive price cutting, misrepresentation of products, and false advertising. Since the code has been in operation, improvement in the price situation, quality of produce, and reliability of hatchery output, have been effected.

NEW YORK LIVE-POULTRY CODE

Undesirable trade practices which have been experienced by the live-poultry industry of New York City, have been handled under the New York live-poultry code which became effective April 23, 1934. While this code has been in operation only 8 months, it has effected savings of approximately \$252,000 to shippers of live poultry through the reduction of coop and cartage charges. It has also brought about an appreciably greater degree of stability in the live-poultry market in this area.

PROPOSED NORTHEASTERN LIVE-POULTRY CODE

On December 5, 1934, a public hearing was held in New York to discuss a proposed code for the live-poultry industry in the State of New Jersey and the metropolitan areas of Philadelphia, Boston, and Providence. This proposed code contains provisions similar to those in the New York live-poultry code.

CHAPTER 14

COMMODITY LOANS

SALIENT FACTS ABOUT COMMODITY LOANS

1. Loans disbursed on cotton direct by Commodity Credit Corporation up to Dec. 31, 1934:	
Disbursed on 1933 crop.....	\$99, 498, 491
Loans on 1934 crop repaid.....	88, 964, 689
Disbursed on 1934 crop.....	15, 342, 121
Loans on 1934 crop repaid.....	98, 751
2. Approximate loans on cotton disbursed by lending agencies under Corporation's purchase guarantee:	
Disbursed on 1933 cotton crop.....	21, 000, 000
Disbursed on 1934 cotton crop.....	207, 901, 509
3. Loans disbursed on corn direct by Corporation:	
Disbursed under 1933 program.....	120, 493, 034
Repaid under 1933 program.....	119, 949, 367
Disbursed under 1934 program.....	3, 576, 798
Repaid under 1934 program.....	108, 196
4. Approximate loans on corn disbursed by lending agencies under Corporation's purchase guarantee:	
Disbursed under 1933 program.....	1, 350, 000
Disbursed under 1934 program.....	6, 025, 901
5. Loans disbursed on gum turpentine and rosin.....	4, 559, 752
Disbursed direct by Corporation.....	2, 102, 301
Disbursed by agencies under Corporation's purchase guarantee.....	2, 457, 451

The Commodity Credit Corporation was created under the laws of the State of Delaware on October 17, 1933, pursuant to the President's Executive order of October 16, 1933. Its entire capital stock of \$3,000,000 was subscribed by the Secretary of Agriculture and the Governor of the Farm Credit Administration, who hold it jointly for and on behalf of the United States. Funds for this purpose have been made available by the President's allocation of \$3,000,000 out of the \$100,000,000 appropriation authorized by section 220 of the National Industrial Recovery Act, and by the Fourth Deficiency Act of the fiscal year 1933, approved June 16.⁸

Under its bylaws the Corporation is permitted to make loans only upon such commodities as may from time to time be designated by the President. These loans have contributed support to farm prices by enabling producers to retain title to products which might have been dumped upon the market with price-depressing effect. They have made it possible for producers themselves to gain the advantage of price increases which otherwise would have been lost to them through enforced marketing, and have contributed to orderly marketing.

Under the policy established by the board of directors, loans have been made only upon commodities in connection with which adjustment or marketing programs of the Agricultural Adjustment Administration have been developed. The loan plan adopted permits banks

⁸ Public No. 77, 73d Cong.

and other lending agencies to carry the loans on the prescribed form of note under a purchase guarantee, the Corporation agreeing to purchase eligible producers' notes when tendered on or before a specified date, usually 30 days prior to the notes' maturity date. The loans are extended at 4 percent interest.

LOANS ON 1933 COTTON CROP

Loans on the 1933 cotton crop were approved October 18, 1933, on the basis of 10 cents per pound for cotton Low Middling in grade and $\frac{7}{8}$ inch or better in staple, and 8 cents per pound for such grades with staple less than $\frac{7}{8}$ inch. These loans originally matured July 31, 1934, but the maturity date was extended to February 1, 1935.

Disbursements by the Corporation in loans to producers on 1933 crop cotton aggregated \$99,498,491.26 on 1,920,759 bales. As of December 31, 1934, loans repaid aggregated \$88,964,689.33 on 1,717,620 bales, leaving the outstanding loans to producers on 1933 crop cotton at \$10,533,801.93 on 203,139 bales. In addition to the loans disbursed by the Commodity Credit Corporation, banks and other lending agencies made loans aggregating approximately \$21,000,000 on approximately 420,000 bales. These loans were repaid direct to such lending agencies. Thus the total loans made on 1933 crop cotton aggregated approximately \$120,498,491.26 on approximately 2,340,759 bales.

The following statements (tables 40, 41, and 42) show the disbursements and repayment of 1933 cotton loans, by months, the number of bales of cotton pledged and released, by months, and the average monthly price for Middling $\frac{7}{8}$ -inch cotton at New Orleans. It will be noted that the price of Middling $\frac{7}{8}$ -inch cotton at New Orleans showed a steady advance from October 1933, the month in which the loan program began functioning; and that repayments of loans were made principally in the months in which the higher average prices obtained. This indicates that the producers, through the help of the loans, were enabled to carry their cotton through the harvesting season when comparatively low prices obtained, and to realize the benefits of the higher prices which prevailed after January 1934.

TABLE 40.—*Loans to cotton producers, by months*¹

Month	Loans disbursed	Loans repaid	Loans outstanding
October 1933.....	\$486,509.73	-----	\$486,509.73
November 1933.....	31,113,225.43	\$1,994.69	31,597,740.47
December 1933.....	18,349,153.41	31,575.46	49,915,320.42
January 1934.....	7,839,586.34	416,814.36	57,338,092.40
February 1934.....	1,636,546.18	5,401,265.81	53,573,372.77
March 1934.....	724,470.64	9,333,781.48	44,964,061.93
April 1934.....	245,868.12	5,815,366.47	39,394,563.58
May 1934.....	2,296,373.40	1,192,434.49	40,498,502.49
June 1934.....	13,902,240.24	6,116,364.62	48,284,378.11
July 1934.....	22,881,444.26	13,613,299.02	57,552,523.35
August 1934.....	23,071.51	10,939,960.82	46,635,634.04
September 1934.....	-----	6,442,581.19	40,193,052.85
October 1934.....	-----	15,059,404.84	25,133,648.01
November 1934.....	-----	9,433,791.08	15,699,856.93
December 1934.....	-----	5,166,055.00	10,533,801.93
Total.....	99,498,491.26	88,964,689.33	10,533,801.93

¹ The increase in "loans disbursed" during May, June, and July is due chiefly to purchase of notes from banks and other lending agencies.

TABLE 41.—*Bales of cotton pledged and released, by months*

Month	Number of bales pledged	Number of bales released	Number of bales remaining pledged
October 1933.....	9, 917	-----	9, 917
November 1933.....	597, 432	40	607, 309
December 1933.....	356, 319	484	963, 144
January 1934.....	152, 139	7, 762	1, 107, 521
February 1934.....	31, 685	104, 166	1, 035, 040
March 1934.....	14, 108	180, 359	868, 789
April 1934.....	4, 732	112, 903	760, 618
May 1934.....	44, 283	22, 389	782, 512
June 1934.....	268, 261	117, 172	933, 601
July 1934.....	441, 425	263, 357	1, 111, 069
August 1934.....	458	211, 350	900, 777
September 1934.....	-----	124, 153	776, 624
October 1934.....	-----	290, 659	485, 965
November 1934.....	-----	182, 325	303, 640
December 1934.....	-----	100, 501	203, 139
Total.....	1, 920, 759	1, 717, 620	-----

TABLE 42.—*Average prices (New Orleans) for Middling 7/8-inch cotton, by months*

Month	Average price per pound	Month	Average price per pound
	<i>Cents</i>		<i>Cents</i>
October 1933.....	9. 22	June 1934.....	12. 09
November 1933.....	9. 74	July 1934.....	12. 71
December 1933.....	9. 93	August 1934.....	13. 27
January 1934.....	10. 91	September 1934.....	12. 96
February 1934.....	12. 11	October 1934.....	12. 57
March 1934.....	12. 16	November 1934.....	12. 59
April 1934.....	11. 82	December 1934.....	12. 79
May 1934.....	11. 39		

LOANS ON COTTON IN PRODUCERS' POOL

Loans to the manager, Cotton Producers' Pool, of 4 cents per pound on cotton held by him, were approved November 18, 1933. These loans aggregated \$38,991,041.76 on 1,949,552,088 bales of cotton and were repaid in full at maturity, July 31, 1934.

LOANS ON 1934 COTTON CROP

On September 6, 1934, loans of 12 cents per pound on cotton Low Middling in grade and 7/8 inch or better in staple, and 11 cents per pound on such grades of cotton with staple below 7/8 inch were approved. As of December 31, 1934, advices received indicated that loans made aggregated \$223,243,631.09 on 3,643,354 bales of cotton. Of this amount \$15,342,121.19 had been disbursed by the Commodity Credit Corporation and the balance was held by banks and other lending agencies. As of the same date, repayments reported aggregated \$820,335.57. These loans mature July 31, 1935.

Loans to the manager, Cotton Producers' Pool, of 2 cents per pound on cotton held by the pool manager were approved November 13, 1934. A commitment of \$20,000,000 was secured from the Reconstruction Finance Corporation for these loans. As of December 31, 1934, loans made to the manager, Cotton Producers' Pool, aggregated \$4,562,125.11.

CORN LOANS

Loans of 45 cents per bushel, on corn stored on the farm in surplus corn-producing areas, were approved November 18, 1933. The loans originally matured July 31, 1934, and were finally extended to October 15, 1934. These loans to producers, disbursed by the Commodity Credit Corporation on 267,761,708 bushels of corn, aggregated \$120,493,034.11. Repayments of these loans as of December 31, 1934, aggregated \$119,949,367.07 on 266,505,692 bushels of corn, leaving the outstanding loans on December 31, 1934, at \$543,667.04 on 1,256,016 bushels. It is estimated that loans made by banks and other lending agencies and repaid direct to such lending agencies, figures on which are not included in loans disbursed by the Commodity Credit Corporation, aggregated approximately \$1,350,000 on approximately 3,000,000 bushels of corn. Including the loans made by banks and other lending agencies, the total loans to corn producers made on 270,761,708 bushels aggregated \$121,843,034.11.

TABLE 43.—*Loans to corn producers, by months*

Month	Loans disbursed	Loans repaid	Loans outstanding
December 1933.....	\$14,560,107.87	\$1,544.40	\$14,558,563.47
January 1934.....	30,442,381.94	9,406.60	44,991,538.51
February 1934.....	20,484,209.67	31,825.75	65,443,922.73
March 1934.....	14,993,465.14	74,047.39	80,363,340.48
April 1934.....	6,767,301.20	119,187.47	87,011,454.21
May 1934.....	3,886,450.70	247,513.03	90,650,391.88
June 1934.....	28,686,808.61	2,967,410.40	116,369,790.09
July 1934.....	670,196.87	15,348,752.19	101,691,234.77
August 1934.....	2,337.11	37,759,238.20	63,934,333.68
September 1934.....	-----	27,283,325.57	36,651,008.11
October 1934.....	-----	24,388,596.12	12,262,411.99
November 1934.....	-----	9,879,990.25	2,382,421.74
December 1934.....	-225.00	1,838,529.70	543,667.04
Total.....	120,493,034.11	119,949,367.07	543,667.04

TABLE 44.—*Corn collateral, by months*

Month	Number of bushels pledged	Number of bushels released	Number of bushels remaining pledged
December 1933.....	32,355,795	3,432	32,352,363
January 1934.....	67,649,738	20,904	99,981,197
February 1934.....	45,520,466	70,724	145,430,939
March 1934.....	33,318,811	164,550	178,585,200
April 1934.....	15,038,447	264,861	193,358,786
May 1934.....	8,636,557	550,029	201,445,314
June 1934.....	63,748,463	6,594,245	258,599,532
July 1934.....	1,489,326	34,108,338	225,980,520
August 1934.....	4,605	83,908,827	142,076,298
September 1934.....	-----	60,436,771	81,639,527
October 1934.....	-----	54,275,116	27,364,411
November 1934.....	-----	21,993,490	5,370,921
December 1934.....	-500	4,114,405	1,256,016
Total.....	267,761,708	266,505,692	1,256,016

Tables 43, 44, and 45 give the disbursements and repayments of corn producers' loans by months, the number of bushels of corn collateral by months, and the monthly average price for Chicago No. 2 corn. It shows that the producers have been enabled both to carry

their corn and to realize benefits from the advancing prices. A comparison of the average monthly price, by months, and the number of bushels of corn released against repayments of loans, will indicate the extent to which the producers have benefited. The 1933 corn-loan program also enabled the producers to hold their corn on the farms and in the ear for feeding requirements.

TABLE 45.—Average prices at Chicago for no. 2 corn, by months

Month	Average price per bushel	Month	Average price per bushel
	<i>Cents</i>		<i>Cents</i>
December 1933.....	0.48	July 1934.....	0.64
January 1934.....	.51	August.....	.77
February 1934.....	.49	September 1934.....	.81
March 1934.....	.49	October 1934.....	.79
April 1934.....	.48	November 1934.....	.87
May 1934.....	.53	December 1934.....	.95
June 1934.....	.59		

Under the 1934 corn-loan program the loan was advanced to 55 cents per bushel on 1933 and 1934 corn stored on farms in accordance with State warehouse requirements. This loan was approved September 27, 1934, and matures July 1, 1935. Under its provisions borrowers were permitted to repledge corn held under the 1933 corn-loan provisions which terminated on October 15, 1934, a previous extension to January 1 having been nullified by the new program. On December 31 of this year corn loans extended under the new program totaled \$9,602,700.03, of which \$3,576,798.44 had been disbursed by the Commodity Credit Corporation and the balance by banks and other lending agencies. Repayments on that date total \$108,196.83.

LOANS ON GUM TURPENTINE AND ROSIN

Loans to producers of gum turpentine and gum rosin on a basis of \$50 per unit, with a deduction of \$10 per unit for carrying charges, were approved July 16, 1934. On September 6, 1934, upon recommendation of the control committee, loans of \$50 per unit with no deduction for carrying charges were approved. As of December 31, 1934, the Commodity Credit Corporation had disbursed a total of \$2,102,301.14 in loans on turpentine and rosin. Banks and other lending agencies hold loans aggregating \$2,457,451.79, making a total of \$4,559,752.93 lent on turpentine and rosin. These loans are in the nature of an orderly marketing loan and were made for the purpose of enabling producers to withhold a portion of their turpentine and rosin from the market during the peak production season, and to market in accordance with an effective demand. The loans mature February 1, 1935.

FUNDS DERIVED FROM RECONSTRUCTION FINANCE CORPORATION

With the exception of its \$3,000,000 paid-in capital and its earnings, all funds used by Commodity Credit Corporation for its loans have been derived from commitments made by the Reconstruction Finance Corporation.

The Commodity Credit Corporation has handled the loans in the field through the loan agencies of the Reconstruction Finance Corporation and under this arrangement has not found it necessary to maintain offices outside of Washington.

There follows a statement of income and expense of the corporation from the date of its incorporation to November 30, 1934 (table 46). It will be noted that the total income collected has exceeded the total expenses by \$899,345.69, and in addition the net interest accrued but not collected totals \$164,333.67, making the net profit as of November 30, 1934, a total of \$1,063,679.36.

TABLE 46.—*Statement of income and expense, Commodity Credit Corporation, as of Dec. 31, 1934*

Income collected:	
Interest on notes—net	\$1, 206, 627. 77
Miscellaneous income	231. 05
Total income collected	<u>1, 206, 858. 82</u>
Expenses:	
Loan forms	76, 547. 21
Agency expense	50, 743. 02
Inspection expense	28, 132. 20
Administrative expense	147, 162. 58
Total expense	<u>302, 585. 01</u>
Net income collected	904, 273. 81
Accrued uncollected interest—net	151, 578. 14
Net profit	<u>1, 055, 851. 95</u>

CHAPTER 15

HOW FARMERS CONTROL ADJUSTMENT

Country-wide organization of farmers for adjusting the position of agriculture and achieving economic self-government has, in its structure and general method, changed but little since it was established under the provisions of the Agricultural Adjustment Act. However, the scope of the activities in which this organization has engaged, and the importance of its various parts in relation to each other, have undergone noteworthy changes in 1934.

Farmers, it has been clearly demonstrated, can call the centralizing powers of Government to assist them in solving their problems and yet adhere to the democratic process on which Government in this country is founded.

Organization and operation under the Agricultural Adjustment Act have, from the beginning, been democratic. Programs submitted for basic commodities, and the marketing agreements and licenses applied to various agricultural products, have been drawn up in consultation with the producers of the commodities; and unless the great majority of those producers have definitely favored the suggested measures, the proposed programs, as in the case of the dairy program under consideration in the spring of 1934, have not been put into effect.

The farmers from the first have had a central part in making decisions. In 1933 they played that part largely through representation by the members and leaders of farm organizations and by State and local agricultural officials. In 1934 the individual farmer took a greater and more direct part in making, modifying, and administering decisions.

One important step in this direction was the use, in three cases, of the referendum method through which producers made known their wishes as to the continuation of a program.

I. COUNTY ASSOCIATIONS AND PRODUCTION PROGRAMS

Farmers who signed more than 3,000,000 contracts participated in production-adjustment programs under the Agricultural Adjustment Act in 1934. They organized in more than 4,200 county production-control associations in a cooperative and voluntary effort to gain control of their own industry and exert that control unitedly through the agency of the Federal Government.

During the year, the scope of the organization was extended. The experience gained in 1933 contributed to the efficiency of the farmer's unified efforts, so that in 1934 localized units dealt more directly with their problems of adjustment than they did in 1933.

Ordinarily a program is developed by the Administration on the basis of factual data concerning the crop, and gradually improved in conferences with farmers and farm-organization leaders. It is modified to meet wishes of farmers expressed in preliminary public conferences with them. During the year, three basic issues have been submitted directly to the producers for decision by referendum. The question of signing a contract is finally left to the individual farmer to decide for himself.

DEMOCRATIC METHOD FOLLOWED

The administration of the programs is decentralized and carried out by the farmers through their community and local production-control units.

This whole process is designed to accomplish two things.

These are, first, to make maximum use of the fact-finding facilities of the Department of Agriculture in developing programs; and, second, to employ the democratic method of placing responsibility upon individual farmers and their leaders in perfecting, effectuating, and administering programs.

When the first programs of the Agricultural Adjustment Administration were inaugurated in 1933, immediate problems had to be met and time was short. In planning these steps, farm leaders and outstanding farmers were called in for repeated consultation, out of which definite programs materialized.

These programs, backed by the best cross section of farm opinion that time permitted the Adjustment Administration to obtain, were put into operation with the aid of the farmers. More than 4,200 production-control associations were organized among farmers themselves as the machinery to carry out the adjustment programs in which more than 1,925,000 production-adjustment contracts were signed by farmers in 1933.

In 1934 the democratic process was carried further, and this progress in developing democratic procedure is one of the most significant advances of the year.

COUNTY CONTROL ASSOCIATION, BASE OF ADJUSTMENT PYRAMID

When a producer signs an adjustment contract he automatically becomes a member of the production-control association for that commodity in his county. He and the other members of the association elect the officers of the associations from among themselves. Details of administration of the adjustment program are in the hands of association committees.

The production-control association does not take the place of any existing farm organization. It is the agency within the county through which the commodity production-adjustment program is administered.

Members pay no dues, but expenses of the association incurred in its legitimate functions are deducted from the benefit payments to members, as provided for in the various production-adjustment contracts. A small remuneration is provided for certain services of committeemen.

COMMUNITY COMMITTEES

The community committee is the nucleus of the county production-control association for a commodity. This committee consists of from 3 to 5 representatives of the signers of production-adjustment contracts in the community. It is responsible for local administration of the adjustment program. The community committee makes production-adjustment contracts available to farmers, assists individual producers in preparing data required in the contract, aids farmers in obtaining substantiating evidence of production and acreage, obtains production data of noncontract signers, checks data offered by cooperating producers, makes adjustments in those data, obtains execution of contracts, certifies as to accuracy of statements in contracts, and checks and certifies performance of contract.

From these community committees come the executives of the county production-control associations who are responsible for county-wide administration of the commodity program.

COUNTY BOARD OF DIRECTORS

The chairman of each community committee in a county becomes a member of the board of directors of the county production-control association for that commodity. After all of the communities have elected their committees, a formal, legal organization meeting of the board of directors of the county production-control association is held. In the deliberations of the board, each member is entitled to one vote. The board of directors determines the budget for local administrative expenses and authorizes expenditures. It hears farmers' appeals from findings of the allotment committee, and carries on other necessary business.

From its membership, the board of directors elects a president of the county association. Other officers are a vice president, a secretary, and a treasurer. The president automatically becomes chairman of the county allotment committee. The board then elects from 2 to 4 more of its members who, with the president, constitute the county allotment committee.

The secretary of the county association keeps all records of the association, of the board of directors, and of the county allotment committee. He maintains copies of all contracts, records of production, and records of distribution of rental and adjustment payments.

The treasurer, who is bonded, has custody of all funds of the association.

DUTIES OF COUNTY ALLOTMENT COMMITTEES

The county allotment committee receives production-control contracts as soon as they have passed through the hands of the community committees. It considers all contracts offered from within the county and makes recommendations to the Secretary of Agriculture on the advisability of accepting each contract.

The county allotment committee completes each contract for final signature of the producer and for acceptance by the Secretary, only after the adjusted total production figures as reported by all cooperating growers in the county, plus the adjusted production reported for noncooperating growers, are consistent with the official production figures for the county as a whole. Making these adjustments is one of the committee's most important duties.

Compliance with terms of the contract is checked by farm supervisors selected by the commodity section of the Agricultural Adjustment Administration from nominations submitted by the county allotment committees. These supervisors visit each contract signer's farm and determine whether the adjustment specified in the contract has been made. The cost of this inspection is borne by the production-control association and is deducted from benefit payments to members. The responsibility of supervising compliance rests upon the county allotment committee and the board of directors of the county production-control association.

STATE BOARDS OF REVIEW

The functions of the county production-control associations insofar as the production-adjustment contracts are concerned are usually coordinated by a State board of review. The State board ordinarily consists of a State crop and livestock statistician, a representative of the State Agricultural Extension Service, and a farmer. This board reviews the work of the county committees and cooperates with the county allotment committees and farmers in making such adjustment in producers' estimates of acreage and production as will bring them into line with official production figures. The board also is responsible for seeing that the work of the various county committees is done uniformly and without discrimination.

Proposed changes in the terms of contracts which are of major importance and are bound to affect a considerable number of producers or meet technical or administrative difficulties are discussed with farm leaders in areas which might be affected. Reactions are obtained from committeemen, county agents, farmers, agricultural specialists, and cooperative organizations. At the same time, economists and specialists in the Department of Agriculture develop the necessary economic data pertinent to the problem.

On the basis of both types of information, an administrative ruling to meet the problem is evolved.

REFERENDUM OF PRODUCERS

The referendum method of obtaining, direct from individual producers, an expression of their desire for or against the continuation of an adjustment measure has been used three times in 1934.

The first actual referendum was that held on the question of a corn-hog adjustment program in 1935.

More than half a million signers of the 1934 contract voted in this referendum. Of the number voting, more than two-thirds favored the adoption of the new program. On this mandate, the detailed program was formulated and the contracts offered to producers.

Referenda similar to the corn-hog vote were used among cotton and tobacco growers to determine whether the Bankhead and Kerr-Smith Acts should be continued in effect in the 1935 season.

II. HOW PRODUCERS WORK THROUGH MARKETING AGREEMENTS AND LICENSES

Specialty crop and dairy farmers, in cooperation with the Agricultural Adjustment Administration, have worked toward improvement in their situation largely through marketing agreements and licenses which have been put into effect for commodities of which approximately a million farmers are producers.

Certain basic principles and methods are common to all these agreements and licenses, although the instruments themselves differ widely.

The number of marketing agreements and licenses that have been put into effect since the Agricultural Adjustment Act was adopted, and the number in effect on December 31, 1933, and December 31, 1934, are shown in the following tabulation:

I—MARKETING AGREEMENTS AND LICENSES

	Actually in effect on—	
	Dec. 31, 1933	Dec. 31, 1934
Marketing agreements.....	33	¹ 29
Licenses.....	27	78

¹ Does not include 26 marketing agreements terminated during 1934.

II—MARKETING AGREEMENTS AND LICENSES

	Approved and put into effect up to—	
	Dec. 31, 1933	Dec. 31, 1934
Marketing agreements.....	33	55
Licenses.....	27	¹ 96

¹ The number of licenses shown for Dec. 31, 1934, as 96, includes 49 milk licenses.

PROBLEMS OF SELF-GOVERNMENT IN FARM MARKETING

For years farmers have been trying, through pools and cooperatives, to achieve orderly marketing and to prevent a demoralization of markets by the additions of surpluses.

The Agricultural Adjustment Act made possible a more effective attack upon this problem. The act exempted marketing agreements from the restrictions of antitrust laws on combinations influencing interstate commerce, and conferred upon the Secretary of Agriculture licensing powers which made marketing agreements reasonably enforceable. But ultimate responsibility for successful operation of these enterprises rests on agricultural producers themselves. There must be a unified resolve on the part of producers to achieve orderly marketing if marketing agreements are to survive and licenses to be enforced.

QUESTIONS ON MARKETING AGREEMENTS AND LICENSES

The four questions which occur most frequently in connection with marketing agreements and licenses are:

- What is a marketing agreement or license?
- How is a marketing agreement or license established?
- How is an agreement or license administered?
- How does it help the industry?

WHAT IS A MARKETING AGREEMENT OR LICENSE?

A marketing agreement is a formal, written compact entered into and signed by parties who are to be bound by its provisions. The Secretary of Agriculture is a party to each such agreement. The other persons or groups who may be parties to the agreement, as enumerated in the Agricultural Adjustment Act, are:

Processors, producers, associations of producers, and others engaged in the handling of any agricultural commodity or product thereof, in the current of, or in competition with, or so as to burden, obstruct, or in any way affect, interstate or foreign commerce.

A license, under the Agricultural Adjustment Act, may accompany a marketing agreement, or be issued independently of an agreement, and a marketing agreement may be established independently of a license.

A license is an instrument issued by the Secretary of Agriculture permitting processors, associations of producers, and others to engage in handling, in the current of interstate or foreign commerce, any agricultural commodity or product thereof, or any competing commodity or product thereof.

The act provides that licenses—

shall be subject to such terms and conditions, not in conflict with existing acts of Congress or regulations pursuant thereto, as may be necessary to eliminate unfair practices or charges that prevent or tend to prevent the effectuation of the declared policy and the restoration of normal economic conditions in the marketing of the commodities or products affected.

LICENSE USUALLY SUPPORTS AN AGREEMENT

In general, where a license accompanies a marketing agreement, its terms and conditions are the same as those of the agreement.

The purpose and the effect of the license used with a marketing agreement is to insure that the objectives of the agreement itself are not defeated by nonconformity on the part of a minority of the members of the industry who might depart from the terms and methods of the agreement in order to profit as individuals at the expense of the industry as a whole.

The license covers all persons engaged in processing, distribution, or handling of the commodity in question, in interstate or foreign commerce, whether they have signed the agreement or not.

Violation of the terms of the license, when this violation is fully established, is ground for the Secretary to revoke the right of the violator to continue in the industry, and there are penalties for so continuing, when the license has been revoked.

ORDERLY MARKETING FUNDAMENTAL PURPOSE

The fundamental purpose of a marketing agreement or license is to establish orderly marketing conditions for an agricultural commodity. Much of the confusion and loss arising from existing marketing processes comes from failure to establish a regular, uniform, and systematic flow of a commodity to market. Often it is not an actual over-supply of a commodity over an entire season which causes ruinously low prices but rather it is the uneven manner in which the commodity is thrown on the market.

FACTORS FOR SUCCESS

Several factors make for success in dealing with a commodity through the agreement or license method: First is a geographically compact area of production. Second is the existence of definite channels through which the commodity must flow in distribution or processing. Third is distance of the producing area from its principal markets. Fourth is previous experience on the part of producers, and processors and distributors as well, in working together in marketing and distributing the commodity. Also, commodities which are perishable are easier to regulate through marketing agreements than are nonperishables.

As examples of products which are produced in compact areas, there are citrus fruits, walnuts, cling peaches, asparagus, raisins, and dates, all produced in relatively small areas on the Pacific coast. Fluid milk, which is produced within easy shipping distance from populous centers, is another example. Tobacco, while it is produced in a number of different States, lends itself to the marketing agreement procedure because of the relatively concentrated areas in which it is grown.

These same products are marketed through definite and well-established channels, and agreements covering them are functioning.

Distance from markets characterizes most of the special crops produced in California, Oregon, Washington, Texas, and Florida, and this helps to explain the advanced development of marketing agreements in these areas. Transportation constitutes an important fixed charge for producers in such areas, and unless control measures are adopted, there is always the chance that prices will fall to the level of this cost or even below, leaving the grower with no return or actual loss. The realization of this fact, in turn, helps to keep the growers banded together for common objectives.

Among the commodities produced by farmers strongly organized in cooperatives are fluid milk, citrus fruits, and walnuts. The most successful agreements and licenses are those backed up by long-established cooperatives, whose members realize that their own enlightened self-interest coincides with the best interests of their group, and have formed the habit of thinking and acting together.

HOW IS A MARKETING AGREEMENT OR LICENSE ESTABLISHED?

Three important steps are taken in the establishment of a marketing agreement or license:

1. Preliminary discussion.
2. Public hearing.
3. Approval by the Secretary of Agriculture.

Preliminary discussion is usually commenced by a group of farm producers who confer with one another, ask the advice of marketing specialists of the State or Federal Government, and negotiate with dealers and processors.

A public hearing is the next step. Here the persons interested in the proposed agreement or license meet with representatives of the Agricultural Adjustment Administration and consider whether an enforceable and effective instrument can be worked out. A tentative draft of the proposed document, developed with the assistance of the Adjustment Administration officials during the preliminary discussion, is the basis of the hearing. Producers, dealers, processors, production and marketing authorities, and representatives of any other interest concerned, including consumers, take part in the hearing.

Fundamentally, all the evidence is introduced in answer to three implicit questions: (1) How would the agreement or license benefit producers? (2) How would the proposed agreement or license affect consumers, processors, and handlers? (3) Would it be possible to operate the proposed agreement or license successfully if it were adopted?

After the hearing the proposed agreement or license is thoroughly studied in the light of all evidence introduced at the hearing and discussion and negotiation in the region where the proposed plan would operate are generally resumed.

The thoroughness of this final analysis and discussion is indicated by the fact that in addition to the hearings which have resulted in the adoption of agreements or licenses, public hearings have been held on 145 proposed instruments which were not adopted.

If it is concluded that the proposed instrument is sound and in consonance with the opinion of the industry, the Secretary gives it his tentative approval. The necessary signatures within the industry are then obtained and the Secretary gives his final approval.

HOW IS A MARKETING AGREEMENT OR LICENSE ADMINISTERED?

In the administration of a marketing agreement or license the following points are important:

1. The administrative instrument is the agreement or license.
2. The administrative body is the control committee or industry board.
3. The administrative officer is the managing agent, manager, secretary, or license administrator.
4. The administrative expense is borne by the industry itself.
5. The supervising agency is the Agricultural Adjustment Administration.

Once the marketing agreement or license, or combined marketing agreement and license, has been approved by the Secretary of Agriculture it becomes the administrative instrument for conducting orderly marketing operations in the given agricultural enterprise. It is constantly consulted.

The administrative body of a marketing agreement or license is variously called a control committee, a control board, or an industry board. But the fundamental principle of each such organization is that all classes of producers and all classes of processors and distributors shall be represented on the administrative body. Some of the agreements and licenses also provide for one or more members—not producers or distributors—to represent the interests of the consumers and the general public.

The members of the administrative body are elected by their respective constituencies, that is, by groups of producers, processors, and others signatory to the agreement. In some instances, where the industry desires to get an agreement or license into operation speedily, the Secretary of Agriculture appoints members of the administrative body. But such appointments are temporary, made to meet the emergency. As soon as possible regular elections are held.

THE ADMINISTRATIVE OFFICER

The administrative body of an agreement or license, of course, must delegate much of the detailed work of carrying out its decisions to a responsible executive. Accordingly, for each agreement or license there is a market administrator, secretary of the control committee, managing agent, or manager—the titles differ but the functions remain the same—whose duty it is to attend to this detailed work.

The expense of administering a marketing agreement or license is borne by the industry itself.

Salaries, per diems, and other costs are borne by the industry and not by the Government, in keeping with the general principle that marketing agreements and licenses are essentially enterprises in economic self-government.

The Secretary of Agriculture, having approved the license or agreement in the first place, naturally is the supervising official. This supervision he carries on through the Agricultural Adjustment Administration.

HOW DOES AN AGREEMENT OR LICENSE HELP THE INDUSTRY?

Fundamentally a marketing agreement or license helps producers, processors, and distributors, and consumers, by putting an orderly process in the place of confusion.

The fundamental principle of orderly marketing leads to a fundamental method: The administrative body of an agreement or license subtracts the salable supply from the available supply and thus ascertains the surplus supply; then it endeavors to move the salable supply into the regular marketing channel, and to utilize the surplus supply in some socially beneficial way outside the regular marketing channel.

METHODS AND PRACTICES

In actual practice, this fundamental method is applied through the use of many specific methods or devices.

Many, but not all, of the agreements and licenses have provisions governing the prices to be paid to producers. These prices are subject to change from time to time as supply or demand conditions change. For some commodities, prices for different qualities and grades are specified. In others, only prices for standard grades or qualities are provided.

The milk licenses specify prices to be paid producers. These prices are supported to some extent by the fact that, because of sanitation and transportation costs, it ordinarily is not feasible to bring milk from outside the regular producing area. In some cases the prices are supported by the fact that new producers must go

through a probationary period before they receive the full privileges of the market.

But experience has shown that the prices specified must be kept in line with the realities of supply and demand, if they are to be generally observed. When they are set too high, a kind of economic vacuum is created, and this inevitably draws in milk at prices below those named in the license. It has been found also that prices of commodities which can be imported cannot be set higher than the figure at which imports will come in.

Besides regulating prices to producers, some of the early marketing agreements and licenses established resale prices—that is, prices at which processors and distributors who were parties to the agreement could sell.

RESALE PRICES INCLUDED ONLY IN EXCEPTIONAL CASES

It is obvious that agreements or licenses in which both prices to producers and resale prices are established automatically fix the margins of processors and distributors. Since the objective of the Agricultural Adjustment Act is to increase the incomes of farmers and not to fix the margins taken by distributors, the present policy of the Adjustment Administration is not to include resale prices in marketing agreements or licenses unless exceptional conditions make their inclusion necessary to effectuate the purposes of the Adjustment Act.

It is generally recognized that prices to producers cannot be supported over any great length of time without control of supplies, and there is no provision for price control in any important commodity, without consideration of supply factors.

Some agreements specify the total quantity of the commodity that may be purchased and processed. In others, as in the citrus-fruit agreement, the administrative body—the control committee—has authority to specify the total quantity which can be shipped to market in a given period of time—each week or each month.

The citrus agreement does not contain price provisions, but relies for its effect on control of supply, which in turn affects prices.

EQUITABLE ACCESS TO THE MARKET

An effort is made to see that access to the limited market provided for by the marketing agreement or license is prorated equitably among all producers. In some cases, as in the milk license, this is assured through the operation of a base-rating plan in conjunction with an equalization fund. In the case of the 1934 cling-peach agreement, all growers were given certificates representing a certain proportion of their available tonnage as indicated by appraisals; and canners were bound by the agreement and license to can only fruit which was accompanied by grower certificates. In other cases, as in that of California raisins, equitable access to market is brought about through the requirement that each packer of raisins place a fixed proportion of his purchase in a surplus pool.

III. AGRICULTURAL ADJUSTMENT ADMINISTRATION AS A COORDINATING AGENCY

Thus the farmers, nationally and in their own localities, operate their own adjustment measures, whether in the form of a production-control program or the use of a marketing agreement or license.

These efforts are coordinated through the work of administrative units of the Agricultural Adjustment Administration established to deal with problems of each of the basic commodities, with marketing agreement and license activities, and with the task of coordinating the steps taken in regard to each commodity or each problem, with the whole plan of restoring the purchasing power of farmers throughout the Nation, and avoiding the possibility that a move made for the benefit of a given commodity or a given group might hamper or obstruct the general forward movement of agriculture as a whole.

This coordination involves studies and activities in the fields of economics, law, science, and finance; it calls for an organization prepared to perform such studies and such activities, as well as to do the more or less routine work connected with the performance of the whole function delegated to the Secretary of Agriculture under the Agricultural Adjustment Act.

Since the enactment of the Agricultural Adjustment Act in May 1933, the objective of Adjustment Administration, namely, the restoration of the purchasing power of farmers to equality with other elements in the population, has remained unchanged. The organization, however, has been changed from time to time, the better to discharge the function of the act. The organization remained substantially unchanged throughout the year 1934.

The Agricultural Adjustment Administration, on December 31, 1934, had on its rolls a total of 6,180 persons, of whom approximately 1,200 were engaged in the field. More than one-fourth of the employees of the Administration were engaged in auditing, checking the production-control contracts signed by more than 3,000,000 individual farmers, in preparing the checks issued to farmers in connection with these contracts, and with the various purchases of surplus agricultural commodities, and in keeping the detailed accounts of all disbursements.

Of the total number of employees 5,187, or more than four-fifths, largely drawn from the ranks of civil-service employees already in the service of the Government at the time of the passage of the Agricultural Adjustment Act, were engaged in clerical, stenographic, filing, and similar work.

THE COMMODITY SECTIONS

The commodity sections within the Administration included sections concerned with wheat, cotton, tobacco, corn and hogs, sugar, rice, general crops, and dairy products.

In the auditing and accounting work there were used various pieces of mechanical equipment newly introduced into Government service.

By the use of these machines a total of 8,699,304 checks had been completed and sent to farmers through December 31, 1934. These checks were for a total of \$569,963,541.51 in rental and benefit payments, and \$105,826,285.21 for the purchase of cattle, sheep, goats, and seed, under the drought-relief program, making a grand total of \$675,789,826.72 distributed in checks turned out by the Comptroller's office.

COOPERATING AGENCIES OF THE UNITED STATES DEPARTMENT OF AGRICULTURE

Cooperating with the Agricultural Adjustment Administration were the Extension Service, the Bureau of Agricultural Economics, and all other agencies of the Department of Agriculture. These have rendered invaluable service in the development and conduct of the various programs. Through the Extension Service, the State directors of agricultural extension work, their staffs, and county agents cooperated with the Administration in both administrative and educational work in connection with programs. The Bureau of Agricultural Economics and other established research and fact-finding agencies of the Department of Agriculture cooperated with the Administration by supplying both general and special economic and statistical reports required in carrying out the purposes of the Agricultural Adjustment Act.

CHAPTER 16

PROCESSING TAXES AND THEIR EFFECTS

SALIENT FACTS ABOUT PROCESSING TAXES

1. Number of commodities on which processing taxes were in effect Dec. 31, 1934.....	8
2. Total collections Aug. 1, 1933, to Jan. 1, 1935.....	\$640, 871, 403
3. Rental and benefit payments distributed to Jan. 1, 1935....	\$527, 493, 047
4. Approximate average monthly collections in 1934.....	\$40, 000, 000
5. Estimated total United States retail sales in 1934.....	\$28, 000, 000, 000
6. Maximum estimated percentage of these sales consumers paid in processing taxes.....	1

At the time of publication of the Administrator's last report, which covered the first 9 months of the Agricultural Adjustment Act, experience of the processing taxes was so short as to confine discussion to their immediate incidence. Now, on the basis of 17 months' experience covering 2 growing seasons, more data are available, both on the taxes themselves and on their general effect.

I. PROCESSING TAXES IN EFFECT AT THE END OF 1934

The number of commodities on which processing taxes are effective changed somewhat during 1934. After the amendment of the Agricultural Adjustment Act in June 1934 to include seven new agricultural commodities in the list of basic commodities, processing taxes became effective with respect to sugarcane and sugar beets, and peanuts. The compensating tax instituted in December 1933 on the manufacture of large jute bags was terminated in June 1934.

Rates of processing taxes in force at the close of 1934 are as follows: Wheat, 30 cents per bushel; cotton, 4.2 cents per pound; corn, 5 cents per bushel; hogs, \$2.25 per hundredweight; tobacco, a rate ranging downward from 6.1 cents per pound, farm-sales weight, depending upon the kind of tobacco and its uses; sugar 0.5 cent per pound of raw (96°) sugar; peanuts, 1 cent per pound, farmers' stock weight.

Compensatory taxes of two sorts are also being levied to equalize the competitive positions of domestic processors of taxed products. A compensating processing tax is levied on paper and jute manufactured into certain products that compete with certain cotton products, and a compensatory import tax is levied against products of foreign origin that would have been subjected to processing taxes if they had been manufactured in the United States.

To forestall heavy advance processing in anticipation of new processing taxes, manufacturers' or wholesalers' stocks on hand when a new processing tax goes into effect and retail stocks held on that date and not disposed of within 30 days are likewise subject to tax. Refunds are made with respect to floor stocks at the time the processing tax is discontinued. Also whenever the rate of the processing tax is either increased or decreased, a corresponding adjustment is made with respect to floor stocks.

Processing taxes paid on the processing of a commodity into products that are exported and on the processing of a commodity into products that are delivered to organizations for charitable distribution or use, including public relief, are also refunded. Exemptions are made to farmers on products raised and processed for their home use.

The penalty for willful failure to pay the processing tax is imprisonment for not more than 10 years, or a fine of not more than \$10,000, or both. This penalty also applies in the case of a storekeeper who accepts, in exchange for other commodities or for cash, the products of an agricultural commodity subject to the processing or floor-stock taxes, and to be sold by him, and who knows the appropriate tax has not been or will not be paid.

SOURCES OF PROCESSING TAXES

Processing-tax collections under the Agricultural Adjustment Act, as reported by the Bureau of Internal Revenue through December 31, 1934, total \$640,871,403.32.

TABLE 47.—*Processing and related taxes collected to Dec. 31, 1934, as reported by the Bureau of Internal Revenue*

Commodity and type	Amount	Commodity and type	Amount
Wheat:		Paper and jute:	
Processing.....	\$167,568,636.20	Processing.....	\$7,070,474.62
Import compensating.....	33,820.78	Import compensating.....	1,031,373.16
Floor tax, other than retail dealers.....	11,090,805.74	Floor tax, other than retail dealers.....	3,162,277.07
Floor tax, retail dealers.....	2,635,386.91	Floor tax, retail dealers.....	70,858.39
Unclassified ¹	272,596.94	Unclassified ¹	14,901.46
Total wheat.....	181,601,246.57	Total paper and jute.....	11,349,884.70
Cotton:		Sugarcane and sugar beets:	
Processing.....	133,178,609.66	Processing.....	22,417,206.80
Import compensating.....	1,738,371.31	Import compensating.....	1,986,317.53
Floor tax, other than retail dealers.....	46,896,267.18	Floor tax, other than retail dealers.....	9,125,751.58
Floor tax, retail dealers.....	11,664,926.17	Floor tax, retail dealers.....	358,180.63
Unclassified ¹	243,482.01	Unclassified ¹	77,720.37
Total cotton.....	193,721,656.33	Total sugarcane and sugar beets.....	33,965,176.91
Tobacco:		Peanuts:	
Processing.....	31,913,607.91	Processing.....	430,018.79
Import compensating.....	283,642.56	Import compensating.....	898.95
Floor tax, other than retail dealers.....	1,838,997.63	Unclassified ¹	4,415.86
Floor tax, retail dealers.....	255,173.99	Total peanuts.....	435,333.60
Unclassified ¹	79,505.61	Cotton-ginning tax.....	121,505.95
Total tobacco.....	34,370,927.70	Unclassified ¹	796.15
Field corn:		Total cotton-ginning tax.....	122,302.10
Processing.....	7,054,607.88	Tobacco producers' sales tax.....	1,065,013.05
Import compensating.....	41,485.78	Unclassified ¹	6,314.32
Floor tax, other than retail dealers.....	1,003,179.64	Total tobacco producers' sales tax.....	1,071,327.37
Floor tax, retail dealers.....	82,840.33	Total collections.....	640,871,403.32
Unclassified ¹	16,014.70		
Total field corn.....	8,198,128.33		
Hogs:			
Processing.....	169,230,027.69		
Import compensating.....	77,906.56		
Floor tax, other than retail dealers.....	6,188,956.16		
Floor tax, retail dealers.....	119,122.94		
Unclassified ¹	419,406.36		
Total hogs.....	176,035,419.71		

¹ Distribution of unclassified made to commodities on basis of proportionate monthly collections.

The sources and receipts from processing and related taxes, according to the commodity on which they are levied, are given in table 47.

POINTS OF COLLECTION

The geographic sources of the collections indicated in table A bring out clearly the location and concentration of the industries which process the farm commodities subject to tax.

Minnesota, New York, Kansas, Missouri, Illinois, and Texas show largest totals of wheat-tax collections because the country's chief flour mills are to be found in those States.

Similarly, the location of the country's textile mills concentrates cotton-tax collections for the most part in North Carolina, Massachusetts, Georgia, South Carolina, New York, and Alabama.

Tobacco-tax collections are greatest in North Carolina, New York, Virginia, and Kentucky.

About one-half of all hog-processing taxes are collected through the packing plants of Illinois.

But the places where the taxes are collected are the places where the taxed goods are processed rather than where they are used. The geography of the points of ultimate tax burden differs materially from the geography of collections.

POINTS OF ULTIMATE TAX BURDEN

In most cases the processor, although he pays the tax, does not in reality bear the burden of the tax. The ultimate taxpayer—that is, the person who bears the tax burden—is the consumer, the person to whom the taxed commodity, bearing the tax with it, passes on from the processor for final use. The ultimate taxpayer, then, is the person who eats the pork and bread and wears the cotton cloth, whose retail prices include the processing tax. In order to find out where rests the burden of the processing taxes, therefore, it is necessary to look first at the population distribution of the country and then to revise that picture somewhat in terms of the consuming population's capacity to pay.

Since bread and cotton cloth are among the indispensable necessities of life, practically every American consumer contributes to a processing tax. Furthermore, except within the limits of temporary local variations, the tax per unit of goods bought by an individual tends to be the same whether he lives in Maine or California, in Montana or Louisiana. The per capita tax borne by one individual as compared to that borne by another, therefore, depends upon the relative quantities of taxed goods which the two buy.

The amount of an individual's purchases obviously depends upon his capacity to pay; it is therefore to be expected that the per capita tax borne by each individual should bear some relation to his income. Since, however, the articles taxed fall largely in the class of necessities, a portion of the tax burden is borne wherever there is even a minimum capacity to pay; and since there are limits to the amount a person can eat or wear beyond which an advance in income increases consumption relatively little, the differences in the amount of processing taxes borne by a person in one income class as compared to another are likely to be great only as between the lower-income brackets. In determining the geographic sources of processing tax contributions, therefore, population distribution is probably a more important factor

than income distribution, though within the lower limits changes in income have an important bearing upon total expenditures for the taxed products.

A general view of the distribution of processing taxes by States, which takes into account the considerations just enumerated, is given in table 48. It includes:

1. The amounts of processing tax collections from processors, by States.
2. The percentage of the national total of processing taxes that has been collected from processors within the State.
3. The State's percentage of the total national population.
4. The State's percentage of the total national income.

TABLE 48.—*Collections, by States, of processing and related taxes, and the percentage of total collection of processing tax, the percentage of total United States population, and the percentage of total national income, for each State indicated, to Oct. 31, 1934*

State	Processing and related taxes collected (thousands)	Percent of total processing tax collected from processors in State to United States total	Percent of total United States population in State ¹	Percent of total income received in State ¹
Alabama.....	\$10,553	1.92	2.15	1.01
Arizona.....	441	.08	.35	.36
Arkansas.....	675	.12	1.51	.67
California.....	16,916	3.08	4.54	6.61
Colorado.....	5,911	1.07	.85	.81
Connecticut.....	2,445	.44	1.30	1.65
Delaware.....	613	.11	.11	.25
Florida.....	831	.15	1.17	.88
Georgia.....	24,978	4.54	2.30	1.15
Hawaii.....	684	.12		
Idaho.....	631	.11	.37	.32
Illinois.....	91,990	16.72	6.20	8.19
Indiana.....	9,262	1.68	2.64	2.26
Iowa.....	16,467	2.99	2.03	1.38
Kansas.....	17,209	3.13	1.54	1.22
Kentucky.....	6,622	1.20	2.13	1.16
Louisiana.....	3,381	.61	1.71	1.05
Maine.....	2,520	.46	.65	.57
Maryland.....	7,079	1.29	1.33	1.39
District of Columbia.....			.30	.66
Massachusetts.....	29,026	5.28	3.47	4.34
Michigan.....	6,598	1.20	3.91	4.54
Minnesota.....	34,514	6.27	2.09	1.75
Mississippi.....	1,017	.18	1.63	.67
Missouri.....	24,398	4.44	3.05	2.62
Montana.....	2,411	.44	.44	.43
Nebraska.....	6,349	1.15	1.12	.82
Nevada.....	160	.03	.07	.10
New Hampshire.....	2,570	.47	.38	.34
New Jersey.....	5,053	.92	3.20	4.36
New Mexico.....	180	.03	.35	.23
New York.....	58,213	10.58	10.22	17.67
North Carolina.....	41,256	7.50	2.57	1.15
North Dakota.....	1,472	.27	.55	.34
Ohio.....	18,937	3.44	5.41	5.80
Oklahoma.....	4,895	.89	1.94	1.35
Oregon.....	3,791	.69	.78	.82
Pennsylvania.....	17,083	3.11	7.87	8.47
Rhode Island.....	4,227	.77	.56	.65
South Carolina.....	23,197	4.22	1.42	.53
South Dakota.....	634	.12	.56	.33
Tennessee.....	7,721	1.40	2.13	1.02
Texas.....	14,643	2.66	4.72	3.43
Utah.....	1,098	.20	.41	.34
Vermont.....	392	.07	.28	.25
Virginia.....	8,815	1.60	1.98	1.20
Washington.....	5,477	1.00	1.27	1.48
Alaska.....				
West Virginia.....	1,406	.26	1.40	.95
Wisconsin.....	5,068	.92	2.40	2.25
Wyoming.....	282	.05	.18	.20
Total.....	550,081			

¹ Based on 1929 data.

II. DESTINATION OF PROCESSING TAXES

Data on the sources of the processing tax receipts during the first two seasons of the Agricultural Adjustment Act are incomplete unless paralleled by figures showing the destination of the funds collected.

BENEFIT PAYMENTS

The purpose of the processing tax is to provide funds to finance current adjustment operations in connection with the country's basic farm commodities. The largest item in this financing is rental and benefit payments to farmers cooperating in the four major crop-control programs, whose contracts associate the interest of the individual with the interest of the whole group engaged in producing the basic commodity or commodities that are raised on his farm.

The payments are calculated to make up as much as possible of the difference between the market price of what the cooperating farmer sells for consumption in the United States and the price which would place him in the position of parity, relative to the country's other producers, that he occupied in the well-balanced period before the war. They are central to the mechanism which makes concerted action by farmers possible, and it is through that mechanism that present accomplishments and future plans for the restoration of farmers' purchasing power are being, and are to be, secured.

The total amount distributed in rental and benefit payments from processing taxes to January 1, 1935, is \$527,493,047.61.

OTHER USES OF PROCESSING-TAX PROCEEDS

Under the terms of the Agricultural Adjustment Act, processing taxes may be used, and have been used, for purposes other than rental and benefit payments to producers cooperating in crop-control programs. Proceeds of these taxes are available to the Secretary of Agriculture, under the act, for expansion of markets and removal of surplus agricultural products, administrative expenses, rental and benefit payments, and refunds on taxes.

Under this authority funds derived from processing taxes have been used to assist in the export of a burdensome surplus of wheat in the Pacific Northwest and to purchase on the market hogs and hog products which have been turned over for distribution among the unemployed. In general the administrative expenses of each crop-control program are defrayed from the proceeds of processing taxes levied upon the commodity concerned, as is set forth in the chapters of this report dealing with the various commodity programs.

III. CONTINUANCE OF PROCESSING TAXES

The approximation to parity of the market prices of certain commodities during the latter months of 1934 brought up the question of whether processing taxes would cease to be assessed on those products. Section 9 of the Agricultural Adjustment Act quite clearly envisages their continuance during the period of the control programs to which they apply, unless special considerations require the Secretary of Agriculture to make an adjustment in the rate of tax in order to effectuate the declared policy of the Agricultural Adjustment Act.

The primary objects of the act are to establish and to maintain a balance between the production and consumption of agricultural commodities so as to obtain for the producers a parity price over a period of time. To accomplish these ends, an extended control program involving benefit payments, which in turn are financed by a processing tax, may be required. The reason for the continuance of the rate of tax is obvious when the connection between processing taxes, benefit payments, and the control programs is borne in mind.

At the time a control program is announced, the Adjustment Administration:

1. Calculates the rate of tax provided for under the act.
2. Determines the extent of reduction deemed desirable as tending to establish and maintain parity prices.
3. Estimates the benefit payments necessary to make the program effective.

If the processing tax were suspended before the close of the life of the program, the funds accumulated through its application might in some cases be far out of line with the total of benefit payments which the Adjustment Administration had contracted to make at the time the farmers signed the contract.

While it is expected that the processing-tax collections and the disbursement in connection with the production-control program will approximately balance at the completion of a given crop-control program, this balance will not necessarily be maintained currently through the life of the program.

Total tax collections have averaged about 40 million dollars a month during 1934, and amounted to over 46 million dollars in December 1934. Rental and benefit payment disbursements fluctuated widely because of the terms of the contracts under which the payments are made. The initial payments in September and October of 1933 were more than twice as great as the tax collections, but during most of 1934 they have averaged about half of the monthly tax collections. In October and November of 1934 payments again substantially exceeded collections.

A tabulation of the gross processing-tax collections and of the total expenditures from processing-tax proceeds, by months, will be found in the appendix.

In this connection it must not be forgotten that one of the outstanding features of the measures adopted to bring about recovery in agriculture and financed through processing taxes, is their self-liquidating character. Because they pay their own way, they constitute no addition to the public debt, no strain on the public credit. They pay their own way because of the contemplated general balance between income from processing taxes and disbursement for agricultural adjustment. This purpose of Congress appears clearly in the terms of the Agricultural Adjustment Act.

The most important reason for continuing the rate of tax, however, as pointed out above, is the necessity of maintaining a control program which will permit the eventual establishment and maintenance of a balance between production and consumption of the agricultural commodities taxed.

IV. EFFECTS ON FARMERS

The primary effect of the processing taxes on the farmer is to make possible crop-control programs providing direct benefit payments to cooperating producers. If there were no crop-control programs the wide fluctuations in farm prices which since 1914 have upset the agricultural balance in a variety of ways, would continue to recur indefinitely.

The processing tax may increase the producer's income in one or both of two ways.

FARMER'S RETURN INCREASED BY PRODUCTION ADJUSTMENT

First, the production adjustment brought about by the programs may of itself increase the farmer's return.

In the case of hogs, for example, the increase of income to the farmer may be brought about without necessarily involving any increased total expenditures by consumers for pork products. In this case, the farmer's return is substantially improved by a higher unit price for hogs, attained through adjustments avoiding market gluts and through savings in the costs of feeding, work, handling, and freight charges on the reduced volume of hogs sent to market. For example, loss of formerly existing export markets for 8 million hogs forced these hogs on the domestic market and drove prices downward. Farmers under that situation received less for the whole crop than they would have received for a volume adjusted downward to conform to the loss of exports. In effect, the farmer's expense of feeding and caring for the excess hogs, and the extra percentage of the customer's dollar required for transporting, processing, and marketing these hogs, were lost to farmers. Preventing such losses by adjusting production to effective demand increases the farmer's return.

The farmer who cooperates in Agricultural Adjustment Administration programs receives his increased income in two parts. First, he gets the open-market price when he sells his product, which may or may not yield a larger total income from the crop than before adjustment and, second, he receives his benefit payment, financed out of processing taxes.

It is sometimes argued in the Corn Belt that the producer pays the tax on hogs because he no longer gets, in the form of the open-market price, the total cost paid by the processor for each hog slaughtered. This is overlooking the fact that cooperating producers as a group, with the distribution of the parity payments, eventually do get all of this total cost paid by the processors; it also confuses the meaning of the term "pay."

Only the nonsigner who does not participate in the adjustment program can be said to bear the tax in any appreciable degree; he does not share in that part of the cost of hogs which is paid by processors in the form of processing taxes, and which part represents increase in total hog income. The nonsigner may be benefited to some extent, however, by the rise in the open-market price brought about through the production adjustment made by contract signers.

CONSUMERS' AGGREGATE EXPENDITURE MAY BE INCREASED

As a second way of increasing the farmer's income, the tax also may increase the aggregate sum spent by consumers for farm products. The tax tends to operate in this way with respect to such commodities as wheat and cotton, for which the demand is relatively rigid, and for which consumption does not readily expand or contract in response to changes in price.

For such commodities, the tax tends to increase the cost per unit to consumers. Such an increase probably is somewhat less than the equivalent of the tax over and above any increase due to the effect of adjustment.

The processing tax sometimes affects producers' income in still a third way. The tax may, for varying periods of time, be paid by the processor without a proportionate increase in the spread between producer and consumer prices. In the case of the processing tax on cigarette tobacco, the tax did not increase the consumer price or reduce the producers' price. The small tax amounting to 0.3 of a cent a package is paid out of a practically unchanged gross margin between the producer and the consumer price. Thus the share of the consumer's dollar that goes to the producer was increased.

For all commodities, the proportion of the consumer's food dollar going to the farmer increased from 33 percent in the first half of 1933 to 37 percent in the first half of 1934.

The above aspects of the processing taxes concern the farmer as a producer receiving income.

Any measure which increases farmers' incomes obviously increases their capacity as consumers of city-produced goods and services, and their ability to pay debts, interest, and taxes.

V. EFFECTS OF PROCESSING TAXES ON CITY PEOPLE

The retail prices paid by consumers for products on which processing taxes are levied may reflect, first, the effects of adjusting supply through cooperation of farmers to control their production, and, second, the effect of the processing tax itself.

This is explained by the fact that, as to one group of products, demand is relatively elastic, rising and falling in relation to consumer income and price, while as to a second group of products demand is relatively inelastic. The first group of commodities includes meat, dairy and poultry products, fruits and vegetables. The second group includes wheat and cotton.

In the first group, hogs are the only commodity on which processing taxes were in effect in 1934. At a given level of income, consumers tend to spend about the same amount of money for pork and lard, whether the supply is moderate or excessive. If farmers adjust hog supplies and eliminate the excessive production, prices of hog products tend naturally to rise all along the line. Consumers pay more per pound for fewer pounds of pork offered. The aggregate consumer expenditures for pork, however, may not increase to any appreciable extent, even though a processing tax is in effect and prices are higher.

The processing tax is built into the higher retail price resulting from adjustment, not superimposed upon the retail price, as appears to be the case with cotton and wheat. Thus consumers tend to pay the hog-processing tax in the sense that they get a moderate rather than a large supply of hog products for their expenditures.

But for wheat and cotton, for which the demand is relatively inelastic, consumers' total expenditures may actually be increased because of the tax. In these cases, consumers pay the tax in the sense that they tend to spend somewhat more for the adjusted supply. It should be pointed out that the tax on hogs represents a larger proportion of the retail price than do the taxes in the cases of cotton and wheat.

TAXES A SMALL PROPORTION OF RETAIL PRICE

In any case, although the processing taxes represent a substantial part of the income that goes to producers, they constitute a relatively small proportion of the average prices of the finished products.

For 1934 the total retail sales for the country as a whole are estimated at about 28 billion dollars and processing taxes for the calendar year will run approximately 500 million dollars. But in this total of collections are included about 175 million dollars on hogs which do not add to the total aggregate outlay by consumers, and about 45 million dollars on sugar which is largely offset by the reduction in tariff on sugar made possible by the processing tax. Furthermore, processing taxes on tobacco amounting to about 25 million dollars, as already indicated, did not increase customary retail prices.

All in all, the net increase in consumers' total retail expenditures, due to the processing tax collections, probably amounts to less than 1 percent.

The consumer is affected by the adjustment programs in ways other than those already described. Most of the price increases of farm products represent advances from the low levels of recent years.

While it is true that these low prices meant that consumers profited for a time by buying cheaply, low prices caused a loss in farmers' ability to buy goods manufactured in the cities and this loss ultimately caused a decline of factory employment, which decline adversely affected city consumers. At the depths of depression, the number of workers who were idle as a result of the inability of farmers to buy city-made goods is estimated at approximately 4,000,000.

The effect of adjustment measures on farm income, and the effect of increased farm income on general economic recovery, are discussed in another chapter of this report.

RURAL-INDUSTRIAL BALANCE

It is at this point that the interest of the farmer and the city dweller as citizens of a commonwealth comes most clearly to light. Measures for balanced production in both rural and industrial areas are vital to the well-being, both of that group of the Nation's producers on whose immediate behalf they are undertaken and of that other group on which effect of these measures is indirect. The Agricultural Adjustment Act has had a substantial effect in returning farm prices and incomes toward parity. The financial mechanism by which that recovery has been achieved is the processing tax and the benefit payment.

CHAPTER 17

CONSUMERS' COUNSEL

SALIENT FACTS ABOUT EXPENDITURES FOR FOOD

1. Retail value of month's supply of 14 foods for typical family in 1934	\$18. 39
2. Value at farm (exclusive of benefit payments)-----	\$6. 90
3. Margin between farm value and retail price, including processing tax	\$11. 49
4. Farmers' share of consumer dollar spent for food for typical family in 1932-----percent--	32
5. Farmers' share in 1933, exclusive of benefit payments-----percent--	35
6. Farmers' share in 1934, exclusive of benefit payments-----percent--	37. 5
7. Approximate increase in cost of living, 1934 over 1933-----percent--	5
8. Increase in retail prices of foods, 1934 over 1933-----percent--	10
9. Approximate increase in urban purchasing power, 1934 over 1933-----percent--	9

Work of the consumers' counsel is intended to consist principally in studying the effects of production-control programs on consumers and in advising on consumer interest in codes, licenses, and marketing agreements. In this latter activity, economists on the staff of the consumers' counsel are expected to scrutinize agreements, licenses, and codes, to guard against provisions which might result in governmental sanction of spreads that represent wasteful marketing practices.

As each new agreement, license, or code is presented by an industry or by a group of producers for approval by the Secretary of Agriculture, a representative of the consumers' counsel joins with other officers of the Administration in hearings and conferences on its provisions. The problems of the industry in relation to farmers' and consumers' interests are studied. In transmitting recommendations to the Administrator and the Secretary of Agriculture, the office of the consumers' counsel points out any tendencies toward private monopoly which may appear in marketing agreements, licenses, or codes where no agency of public control is provided; the possible effects of any direct price fixing measures; possibilities for incorporating consumer quality and labeling standards; and provisions or lack of provision for representation of consumers in control agencies.

The office of consumers' counsel has begun general studies to record the effects of marketing agreements and production-control programs on consumers' prices, and the relation of processing taxes to prices paid by consumers. Examination of the correlation between farm and retail prices has been started. With the cooperation of the Bureau of Labor Statistics, which collects data on retail prices, and of the Bureau of Agricultural Economics, reporting prices received by farmers, the consumers' counsel has been able to follow and report on the trends of consumer prices as related to advances in prices to farmers and to the imposition of processing taxes.

RETAIL FOOD PRICES IN 1934

Retail prices of food in 1934 were about 10 percent higher than in 1933. Expenditures for food comprise about one-third of the average city budget. In other words, the cost of food is a third, more or less, of the average urban consumer's cost of living. Among low-income family groups—below \$750 a year—expenditures for food may require as much as half of the family income.

The cost of living in 1934 was about 5 percent higher than 1933. Thus the retail food prices advanced during the year more rapidly than did the cost of living, which includes food prices. However, the level of food prices as compared with 1913 is still lower than the level of living costs, despite the more rapid increase in retail food prices during 1934.

Retail food prices at the close of 1934 were about 114 percent of the 1913 level, and the cost of living was about 137 percent of the 1913 level.

As compared with a 10-percent increase in retail food prices during the year, clothing prices were about 10 percent higher, fuel and light about 3 percent higher, house furnishings about 10 percent higher, and rents somewhat lower.

The rise in the cost of living was accompanied by an increase of purchasing power in the hands of the urban consumers. Current income of urban consumers in 1934 was about 5 billion dollars more than in 1933. Taking higher living costs into account, this is an increase of about 9 percent. The increase in urban purchasing power was larger than the increase in the cost of living.

The increase in cost of living also was accompanied by a more rapid rise in that portion of urban income which was distributed as pay rolls to those persons who were employed. The number of persons employed in December 1933 was 74.4 percent of the number employed of the 1923-25 average. Employment in December 1934 was 78 percent of the 1923-25 average. Factory pay rolls increased from 54.5 percent to 63.2 of the 1929 level. Thus the average wages received by persons employed in December 1933 were 73 percent of the 1929 average, as compared with 81 percent in December 1934. The average pay rolls received by employed persons increased nearly 11 percent. Contrasted with this increase, cost of living in December 1934 was about 4 percent higher than in December 1933.

These comparisons do not take into account the situation of the unemployed. However, it appears that the real problem of the urban consumer was not the increase in food prices, but the lack of income among a large number of unemployed who had relied on industry for their livelihood.

FARMER'S SHARE OF CONSUMER DOLLAR

This research work has developed the fact that the farmer's share in the consumer's food dollar has during the year shown a slow but steady increase.

In studying this increase a list of 14 common foods was selected. The cost of the monthly purchases of this list for a typical family was ascertained. The average cost of the list in 1932 was \$16.78. For the raw materials used in the foods listed, the farmer received in that year \$5.54, or 33 cents out of each consumer dollar.

In 1933 the consumer cost for these foods had dropped to \$16.44, while the farm value had stepped up to \$5.81, making the farmer's share 35 cents of each consumer dollar, exclusive of benefit payments.

In 1934, recovery measures increased both the cost of the typical monthly purchases of these foods, and prices that farmers received for the raw materials that went into them. The retail cost of the foods rose to \$18.39, and prices to farmers rose to \$6.90. At the same time the proportion of the consumer's dollar going to the farmer increased to 37.5 cents, exclusive of benefit payments.

The staff of the consumers' counsel has examined the differences between the retail values and the farm values, or the "spreads" that represent all the charges of transportation, processing, and marketing of these foods.

It has found that many of the costs of food distribution and processing are relatively fixed. This helps to account for the more severe drop in farm prices than in retail prices during the depression.

At the pit of the depression in farm prices in 1932, costs of transporting, processing, and marketing a month's supply of the 14 listed foods for a typical family were \$11.24. During 1934 these costs averaged \$11.49.

There seems, on the whole, to have been no general pyramiding of food prices.

Table 49, developed by the consumers' counsel, shows the range of retail food prices, farm prices, and middlemen's charges during the past 10 years. The figures show that while retail food costs have advanced somewhat, they were still in 1934 far below the 1929 level and even below the 1931 level. Since 1932 the farm price has shown a much larger percentage of increase than the retail price.

TABLE 49.—*Cost of transporting, processing, and marketing foods, 1924 to 1934*
[Spread between cost of a month's supply of 14 foods for a typical family and the value of these foods at the farm]

Year	Retail value	Value at farm	Margin between values at farm and at retail	Farm-er's share	Year	Retail value	Value at farm	Margin between values at farm and at retail	Farm-er's share
				<i>Percent</i>					<i>Percent</i>
1924.....	\$24. 04	\$10. 81	\$13. 23	45. 0	1930.....	\$24. 20	\$10. 82	\$13. 46	44. 4
1925.....	26. 24	12. 54	13. 70	47. 8	1931.....	19. 89	7. 55	12. 35	37. 9
1926.....	26. 97	13. 04	13. 93	48. 4	1932.....	16. 78	5. 54	11. 24	33. 0
1927.....	26. 16	12. 19	13. 96	46. 6	1933.....	16. 44	5. 81	1 10. 63	2 35. 3
1928.....	25. 97	12. 44	13. 73	47. 1	1934.....	18. 39	6. 90	1 11. 49	2 37. 5
1929.....	26. 11	12. 40	13. 71	47. 4					

¹ Including processing taxes.

² Excluding benefit payments.

Foods included in the above table are: 12.4 pounds of beef, 6.2 pounds of pork, 0.7 pound of lamb, 1.9 pounds of chicken, 5.1 dozen eggs, 28.1 quarts of whole milk, 6.4 pounds of evaporated milk, 5.5 pounds of butter, 1 pound of cheese, 2.9 pounds of rice, 58.7 pounds of potatoes, 22 pounds of flour, 44.2 pounds of bread, and 1.9 pounds of macaroni.

A continuing record of retail prices of typical cotton textiles also has been undertaken. This record provides a basis for checking on the effect of the cotton-control program on consumer prices.

Collection of retail prices on cotton overalls, work shirts, sheets, and unbleached muslin, in 25 cities, was started July 27, 1933, 5 days before the cotton processing tax went into effect and 20 days before the N. R. A. cotton textile code became effective.

Comparison of retail prices, farm prices, and margins on July 27, 1933, and December 18, 1934, is made in table 50. The table shows for the latter date processing taxes from which benefit payments are made to farmers.

TABLE 50.—*Comparison of farm and retail prices in cents, for various cotton products on July 27, 1933, and on Dec. 18, 1934, showing margin between farm and retail price, and amount of processing tax*

Article	Retail price		Farm price		Margin ¹		
	July 27, 1933	Dec. 18, 1934	July 27, 1933	Dec. 18, 1934	Process- ing tax	July 27, 1933	Dec. 18, 1934
	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>
Overalls.....	109	160	20	26	8.27	89	125.73
Work shirts.....	73	90	9	11	3.49	64	75.51
Sheets, 81 by 99 inches.....	99	130	19	24	7.66	80	98.34
Unbleached muslin, yard.....	10	14	3	4	1.13	7	8.67

Distributor's margins do not include processing tax.

THE CONSUMERS' GUIDE

Protection of consumers' rights to fair prices and quality is not only a function of the Administration but a responsibility of consumers themselves. To this end, and under the authority of the Agricultural Adjustment Administration, the office of consumers' counsel has assembled and given publicity to factual material on changes in the prices of foods and materials, both to the farmer and to consumers, and has attempted to assist in the self-protection of consumers by publishing material intended to advise them in intelligent buying.

This information is released in the form of a biweekly bulletin, the Consumers' Guide. In each issue of this bulletin are published current reports on retail prices of 35 foods in 51 cities; changes in farm prices of the raw materials in these foods; and discussion of factors influencing the movements in these prices.

At less frequent intervals, data on prices of cotton materials are included. Articles of a more general character, intended to aid consumers in understanding the relation of the agricultural adjustment program to general economic recovery, and acquaint them with efforts being made by individuals and groups of consumers to obtain the greatest possible value for their expenditures, are also published in the Consumers' Guide.

During 1934 the Consumers' Guide has included articles on better buying; on the importance of a consumer check on weights and measures; on the organization of the production and distribution of milk, potatoes, sugar, evaporated milk, pork products, and other farm produce; on standardized grading and labeling of food products; on direct marketing of farm products; on cooperative purchasing; on consumer efforts to increase consumption of farm products; on the incidence of processing taxes; and on the purchase and distribution of food supplies to needy families, etc.

The Consumers' Guide is distributed free to Federal, State, and local Government officers, to the press, and to officers of such consumer organizations as the General Federation of Women's Clubs, the American Association of University Women, the national and State leagues of women voters, Business and Professional Women's League, American Home Economics Association, the Women's Trade Union League, county consumers' councils, self-help organizations, and many others. Requests for individual subscriptions have been received from more than 40,000 consumers. The distribution at the beginning of 1934 was 24,000 copies, and at the end of the year, 50,000 copies.

RADIO BROADCASTS

The consumers' counsel continued through 1934 the weekly radio interview between the consumers' counsel and an officer of the General Federation of Women's Clubs. The information given in these broadcasts consists, on the one hand, of the broad presentation of some phase of Adjustment Administration activity, its problems and their solution as they touch consumer interest; on the other hand, of concrete details of buying information, movements of prices, and interpretation of those movements. Suggestions on dealing with immediate individual consumer problems are made. The programs also seek to promote a better understanding of the Adjustment Administration's general relationship with the consumer.

To the radio work of consumers' counsel there has been added this year a syndicated series of 10-minute speeches called "Consumer Facts" released from this office through the radio service of the Department of Agriculture. This service was accepted and scheduled for regular weekly local presentations by 150 radio stations. In subject matter it is similar to the interviews described above.

Occasional speeches have been made by the consumers' counsel on the Farm and Home Hour—the Department of Agriculture's program broadcast over 50 stations.

Adaptations of the Federation of Women's Clubs program into dialogs designed for classroom discussions on general consumer problems have been requested by more than 1,000 adult education and other groups.

EXHIBITS

Exhibits of material on consumer education were in increasing demand during the year. A series of posters, consisting of enlargements of photographs and drawings that had been published in the Consumers' Guide, were prepared by the office of consumers' counsel for exhibit at National and State conventions of consumer organizations, State fairs, farm and home weeks, and extension conferences. Arrangements for managing the exhibits were made with officials of the consumer organizations, chairmen of local county consumer councils or with extension workers of the Department of Agriculture.

Among the gatherings at which exhibits have been shown are:

Annual convention of the General Federation of Women's Clubs at Hot Springs, Ark.

National Congress of Social Work, Kansas City, Mo. This group included delegates from all the major public and private social agencies in the country.

Annual meeting of the National Education Association in Washington, D. C. Over 20,000 teachers and administrators from all over the United States attended this convention.

Century of Progress Exposition, Chicago.

Consumers' League of Kansas City.

Vocational Education Conference, Nashville, Tenn.

Second Business Conference of the School of Business, University of Chicago.

Consumer and Cost of Living Conference, St. Louis, Mo.

Eastern States Exposition, Springfield, Mass.

In connection with the exhibits about 100,000 pieces of literature have been distributed. These included copies of the Consumers' Guide, reprints of radio talks, and special leaflets on consumer subjects.

NATIONAL MILK SURVEY

For several years dairymen have been producing milk at prices which have brought severe hardships to their families and farm business. Yet it should be an obligation of society as a whole, and not the moral responsibility of the Nation's dairymen, to provide dairy products for that portion of the consuming population unable to pay a fair price for them.

In recognition of the fact that society is interested in the health of all, a national milk survey was undertaken in 1934 by women in 59 communities in 46 States. The purpose of this survey was not only to determine the situation with respect to consumption of milk, but to focus public attention on the problem. In response to a request made to the Secretary of Agriculture by leaders of 12 national women's organizations, the direction of the survey was assumed by the consumers' counsel. Local organizations of women, cooperating with the public schools, collected the data.

Reports were obtained from 29,485 families, all of them with children in school and with incomes ranging from average to very low. Of the total, more than 14 percent reported that they bought no fresh milk at all. Average purchases of fresh milk by all families amounted to less than six-tenths of a pint per capita daily. Average purchases of evaporated milk amounted to more than 18 pounds a year per capita. These purchases, both of fresh and evaporated milk, were found to be 27 percent below the quantity of milk specified in the "restricted diet", described by the Bureau of Home Economics as a subsistence level for a limited period only.

OTHER INFORMATIONAL ACTIVITIES

The growth of interest in the field of consumer economics was one of the significant developments of 1934. Many national women's organizations have not only incorporated study of consumer problems in their programs, but have organized departments of information to encourage cooperation with various recovery administrations. The consumers' counsel has been called upon by these organizations to function as a kind of clearing house for consumer information, coordinating information on various consumer services of the Government.

Services of this character have been rendered to such organizations as:

General Federation of Women's Clubs.

American Association of University Women.

National Congress of Parents and Teachers.

National Council of Women of the United States.

National League of Women Voters.

National Federation of Business and Professional Women's Clubs.

National Association of Colored Women.
National Council of Jewish Women.
National Council of Catholic Women.
Southern Women's Educational Alliance.
National Women's Trade Union League.
National Young Women's Christian Association.
American Women's Hospital Association.
American Nurses' Association.
Woman's Christian Temperance Union.

Cooperating with the Consumers' Division of the National Emergency Council, the consumers' counsel has been in close communication with their authorized county consumers' councils in supplying information on the agricultural program. Between 140 and 150 of these councils have been organized for the purpose of aiding in the local adjustment of consumer problems and acting as a two-way channel through which factual economic information may be distributed to consumers.

Students and teachers from hundreds of schools and colleges have been supplied information on the agricultural recovery program and its bearing on consumers.

Behind these educational efforts of the consumers' counsel has been the dual purpose of identifying agricultural and city workers' interests and aiding the "slowly growing impulse among consumers to enter the industrial market place equipped with sufficient organization to insist upon fair prices and honest sales", recognized in the President's message to Congress in January 1934 as a policy of the national administration.

CHAPTER 18

LEGAL PHASES AND DEVELOPMENTS

I. SUMMARY OF AMENDATORY LEGISLATION

The amendments which have been made to the Agricultural Adjustment Act during 1934 can be briefly summarized under the following heads:

1. Enlargement of class of "basic agricultural commodities" to include additional commodities.
2. The enactment of a complete regulatory plan for sugar beets and sugarcane.
3. Provision of supplementary procedures with respect to the handling of cotton which the Secretary of Agriculture has acquired.
4. Special amendments clarifying and expanding the tax provisions of the act.
5. Miscellaneous clarifying provisions.

BASIC AGRICULTURAL COMMODITY CLASS ENLARGED

By amendment, the benefit-payment and processing-tax provisions of the act can now be made effective for rye, flax, barley, grain sorghums, cattle, sugar beets and sugarcane, and peanuts, in addition to the basic agricultural commodities to which these provisions of the act had already been applicable. Sugar beets and sugarcane were added by the Jones-Costigan Sugar Act, approved May 9, 1934; all the others by the Jones-Connally Act, approved April 7, 1934.

REGULATORY PLAN FOR SUGAR ESTABLISHED

By the provisions of the Jones-Costigan Sugar Act, there were established calendar year marketing quotas for the United States sugar beet producing area, and for the States of Louisiana and Florida. The Secretary of Agriculture was to estimate the consumption requirements of sugar for continental United States for the calendar year and, on the basis of a representative standard indicated in the sugar act, allot the difference between his estimate of domestic consumption requirements, and the guaranteed quotas to the continental United States, among the insular areas of the United States and foreign countries, including Cuba. Further provision was made for the allotment of these regional quotas among processors, handlers of sugar, and others. The Jones-Costigan Sugar Act also made specific provision for the inclusion in benefit contracts and marketing agreements of provisions which would limit or regulate child labor and would fix minimum wages for workers or growers in the industry; and conferred upon the Secretary authority to adjudicate disputes.

The Jones-Costigan Act makes exceptions with respect to sugar beets and sugarcane that are not duplicated for other commodities.

1. Thus, it includes a provision requiring that the Secretary set the benefit-payment and processing-tax plan in operation by the thirtieth day after the adoption of the act instead of the usual provision that the processing tax be in effect from the beginning of the marketing year next following the date of the proclamation that benefit payments are to be made.

2. The rate of processing tax had to be specially dealt with, in large measure because "first domestic processing" was specially defined, and also because the rate of tax was limited to the amount of the reduction in the rate of duty adjusted to the tariff arrangement between the United States and Cuba.

3. Although the original act was inapplicable to the Philippine Islands, the Virgin Islands, American Samoa, Canal Zone, and the Island of Guam, the President was now empowered, in the case of sugar beets and sugarcane, if he found it necessary to effectuate the declared policy, to make the provisions of the Agricultural Adjustment Act applicable to these hitherto excepted possessions of the United States.

4. While the termination of the Agricultural Adjustment Act as a whole is dependent upon the President's determination that the national economic emergency in relation to agriculture has been ended, in the case of sugar beets and sugarcane, the regulatory plan is to terminate at the end of 3 years after the adoption of the Jones-Costigan Act. It is, of course, possible that the act as a whole may be terminated sooner.

5. The President is authorized to provide that part or all of the proceeds of taxes collected from the processing of sugar beets or sugarcane in the Territories of Puerto Rico and Hawaii or the insular possessions, or upon the processing within continental United States of sugar coming from these areas, shall be held as a separate fund in the name of the Territory upon the processing of sugar from which the tax was collected. This fund may be expended for the benefit of agriculture, or paid out as rental or benefit payments for sugar beets or sugarcane reduction, or used for expansion of markets and removal of surplus products in such areas.

6. Special provisions are also in force for floor stocks taxes on sugar, particularly sugar in customs custody or which is still the subject of a bona fide contract or sale.

7. The Jones-Costigan Act also made provision for the establishment of separate quotas for edible molasses and syrup of cane juice.

8. Finally, the Secretary of Agriculture was authorized to purchase not in excess of 300,000 tons of sugar (raw value) from surplus stocks of direct-consumption sugar produced in the United States beet-sugar area, said sugar not to be included in the quota for such areas. The proceeds deriving from the sale or other distribution of this sugar (including distribution for unemployment relief) was to be appropriated for the general purposes of the Agricultural Adjustment Act.

SUPPLEMENTARY PROCEDURES WITH RESPECT TO HANDLING COTTON

Section 4 of the original Agricultural Adjustment Act, dealing with the authority of the Secretary of Agriculture to borrow money upon cotton in his possession or control, has been amended to confer upon the Secretary of Agriculture an additional means of procuring money.

The original act merely provided that the Secretary of Agriculture was to have the authority to borrow money upon cotton in his possession or control and deposit warehouse receipts for such cotton as collateral for the loan. The requirement of deposit of warehouse receipts as collateral is now made discretionary with the Secretary of Agriculture. In addition, the new section authorizes the Secretary of the Treasury to advance \$100,000,000 to the Secretary of Agriculture, at his request, for the purpose of paying off debts, discharging liens and paying expenses incident to carrying, handling, insuring and marketing the cotton which the Secretary may have acquired. The request for such funds is to be accompanied by a statement showing the quantity and quality of cotton held by him and its approximate aggregate market value. Funds thus acquired by the Secretary of Agriculture, may, within his discretion, be advanced to agencies which he has established for handling and marketing the cotton. Provision is also made for the disposition of the proceeds derived from the sale of cotton.

LOANS CANNOT EXCEED MARKET VALUE

The amendment to section 5 expands in general language the purpose for which the Reconstruction Finance Corporation may make loans to the Secretary of Agriculture to include the performance of any of his duties and functions under part I of the act. It contains the provision, however, that the advance of money or loan is not to be in excess of the market value of the cotton or the interest of the Secretary of Agriculture in the cotton upon which the advance or loan is being made, plus certain handling, carrying, and marketing costs. Instead of the previous provision, which provided that the Secretary was to deposit warehouse receipts as collateral security (and, in the event of the impracticability of such deposit, that the Reconstruction Finance Corporation take such other security as it considered acceptable), there was substituted a provision exonerating the Secretary from depositing any evidence of title to the cotton as security, and declared it sufficient if he gave to the corporation a written statement showing the quantity and quality of cotton against which the advance or loan was being made. Furthermore, the Secretary was instructed by Congress to dispose of all the cotton held by him by March 1, 1936.

AMENDMENTS CLARIFY AND EXPAND TAX PROVISIONS

The tax provisions of the Agricultural Adjustment Act received extensive amendment during the course of the year. In addition to the special provisions with respect to sugar which have been dealt with above, the general provisions with respect to administration were more carefully articulated and their enforcement made more explicit.

1. Thus, the original act allowed an exception to the defined rate of processing tax in the situation where such a rate of tax would reduce consumption and thereby result in the accumulation of surplus stocks or the depression of farm prices. An amendment took cognizance of the situation where the levying of a tax had such undesirable effects only when the processing was for particular uses of a commodity, and gave the Secretary authority to lower processing tax rates on processing for any designated use or uses as well as on processing of the commodity generally.

2. Processing, the definition of which is of considerable importance in connection with the levying of processing taxes, was more explicitly defined so that it would be clear that it comprehended manufacturing and the preparation of a commodity for distribution or use. It also received special definition in the case of sugar beets and sugarcane and peanuts.

3. Section 15 of the Agricultural Adjustment Act originally authorized the Secretary of Agriculture, in situations where the products of any commodity were of such low value that the levying of a processing tax would in great measure prevent the use of the commodity in the manufacture of such products, to make a certification to that effect to the Secretary of the Treasury, and then provided that the Secretary of the Treasury was to refund taxes paid with respect to the amount of the commodity used in the manufacture of the low-value products. This was clarified by amendment stating more specifically the contents of the Secretary of Agriculture's certification, and allowing the certification to contain recommendations for the suspension of processing taxes, and the making of refunds.

4. The exemption from taxes under the act, of persons delivering products to organizations for charitable distribution, was by specific enumeration clearly made to include State or Federal organizations or institutions, whether involved as givers or users of the products. In addition, refunds or credits of the tax were made dependent upon proof that the tax had not been included in the price of the product delivered to the charitable organization, or that, if so included, the processor had repaid, or agreed in writing to repay, the amount of such tax. A time limitation of refunds to 6 months after the delivery for charitable distribution or use was imposed.

5. The procedure in connection with floor-stocks taxes was also elaborated. For example, taxes on articles in customs custody or control on the effective date of the tax had to be paid prior to release from customs custody or control.

6. It was provided that whenever there is a decrease or an increase in the rate of the processing tax an adjustment shall be made with respect to floor stocks, so that all of the products of a commodity may move into channels of trade bearing an equal tax burden.

7. Refunds of taxes in connection with exportation to foreign countries and insular possessions are directed to be specifically made to the exporter or consignor named in the bill of lading under which the product is exported. Furthermore, instead of insisting that the product be processed wholly or in chief value from a commodity with respect to which a tax under the act has been paid, refunds are now allowed on the exportation of products which are partly processed from tax-paying commodities.

8. The Secretary of the Treasury's authority to permit postponement of payment of taxes for a period not exceeding 90 days has, by amendment, been extended to 180 days.

9. Furthermore, the act now concludes with provisions imposing a fine of not more than \$1,000, or imprisonment for not exceeding 6 months, or both, as a penalty upon the making of false statements (written or oral), in connection with (a) purchases, (b) processing charges, or (c) settlements under contracts to buy, which would lead any person to believe that any amount deducted from the market

price, or charged for processing, or deducted from the gross sales price, respectively, consisted of a tax imposed under the Agricultural Adjustment Act, when the person making the statement knows it to be false.

MISCELLANEOUS CLARIFYING AMENDMENTS

Additional amendments enacted by Congress at the last session operated in various ways to clarify different provisions in the Agricultural Adjustment Act.

1. One such amendment clarified the operation of the marketing agreement section of the act, so as to render unmistakably clear what had already been understood. That the current of interstate commerce, the handling of commodities in which is the subject of regulation by marketing agreements, may include commodities which burden, obstruct, or in any way affect interstate or foreign commerce.

2. The Secretary of Agriculture was given power to make public such information as he deems necessary to effectuate the purposes of the act, notwithstanding any provisions of existing law.

3. The district courts of the United States were vested with jurisdiction specifically to enforce and to prevent persons from violating the provisions of the sugar act, or orders, regulations and agreements, or licenses made pursuant to the act as a whole. It was also made the duty of the district attorneys of the United States to enforce the remedies and collect the forfeitures provided for in the act.

4. The act was amended to provide that any person willfully exceeding any quota or allotment fixed for him by the Secretary pursuant to the act should forfeit to the United States a sum equal to three times the current market value of such excess, and that such forfeiture should be recoverable in a civil suit brought by the United States.

II. COURT DECISIONS ON AGRICULTURAL ADJUSTMENT ACT LITIGATION DURING 1934

SIGNIFICANT POINTS DEVELOPED IN COURT

A survey of Agricultural Adjustment Act litigation in the courts during 1934 discloses these significant points:

1. The court decisions involving the licensing section (sec. 8 (3) of the Agricultural Adjustment Act) have, with two exceptions, been based upon the question of interstate commerce under the statute; these two exceptions, as noted below, were decisions with respect to constitutionality.

2. There has been no decision by any circuit court of appeals (and of course not by the Supreme Court of the United States) on the constitutionality of any section of the Agricultural Adjustment Act statute.

3. In the lower courts there has been one decision upholding the constitutionality of the processing tax-sections of the act; and this case represents the only challenge to these sections.

4. There has been one case upholding the constitutionality of the so-called "Sugar Act" (which is part of the Agricultural Adjustment Act statute); and this is the only challenge to the Sugar Act made in the courts.

5. There have been only two lower-court decisions on the constitutionality of section 8 (3) (licensing section): One in Florida by the lower Federal court holding the entire act unconstitutional, which was reversed by the circuit court of appeals (5th circuit) upon the ground that the question of constitutionality was not, upon that record, properly before the lower court; the other a decision by a lower Federal court in Chicago upholding the constitutionality of section 8 (3) and the Chicago milk license (from which decision no appeal was taken).

6. Of the 17 cases in which the validity of licenses issued under section 8 (3) of the act was challenged (either offensively or defensively) only three cases went to a final decree.

7. Thus far all of the other decisions, in cases involving licenses issued under section 8 (3) of the act, were rendered in granting or refusing preliminary injunctions.

8. The only serious setback sustained by the Government was in seven decisions involving the validity of milk licenses on the question of interstate commerce which were decided between July 1934 and November 16, 1934. In all of these seven cases the lower Federal courts held on the record in each of the cases respectively that the Federal Government had no right to regulate the dairies in these cases. However, it is important to note (a) that each of the dairies involved purchased and sold all of its milk within the same State, (b) that practically no fluid milk was shipped into the State (in which the dairy did business) from another State—in other words, there were no interstate shipments of fluid milk.

In each of these seven cases the Government sought to justify the legality of the Federal regulation of fluid milk in these seven milk sheds upon the sole ground that dairy products (butter, cheese, etc.) were and are being transported in great quantities in interstate commerce throughout the country; that the price received by producers for their fluid milk in these markets is so interrelated with the price of these products which move in interstate commerce that the price of the former substantially affects the price and movements of dairy products in interstate commerce; and hence Federal regulation of the purchase of fluid milk from the producer for consumption in these milk sheds is legally justified.

This contention of the Government was overruled by the lower courts in these seven markets. This theory of the Government is still somewhat novel and less familiar to the courts. In three of these cases appeals have been taken to the circuit court of appeals.

In one of the seven cases (the Baltimore case) the lower Federal court held that the Baltimore milk license was not authorized by section 8 (3) of the act because it, in effect, contained a marketing plan instead of being limited merely to matters which may be referred to as "unfair practices or charges."

9. In order accurately to appraise the trends of judicial decisions in Agricultural Adjustment Act litigation, the theory of the Government in these seven cases should be sharply and clearly distinguished from the theory of the Government in markets like Chicago and Boston, for example. In these latter markets the theory of the Government is briefly as follows: That in excess of 40 percent of the milk consumed in these milk sheds is produced outside of the State; that in order for the Federal Government to effectively regulate the interstate milk, it is necessary to regulate the milk produced and sold within each milk shed respectively.

This contention of the Government was presented to the Federal courts in Chicago in three cases. In the first case a judge of the lower Federal court sustained the theory and upheld the Chicago license. The other two Chicago cases were both decided by another judge who held the theory, and the facts supporting this theory, immaterial upon the ground that the Chicago milk license was a regulation of production of milk, and hence could not be interstate commerce. In the case decided favorably to the Government no appeal was taken. In the other two cases, the Government has taken appeals.

NATURE OF EACH CASE

1. *Ewa Plantation Company et al., v. Henry A. Wallace*, S. C. Dist. Col., Oct., 1934. (62 W. L. R. 830) Sugar Agt.

In this case 37 companies producing and processing Hawaiian sugarcane brought suit in the Supreme Court of the District of Columbia for an injunction restraining the Secretary of Agriculture from carrying into effect the provisions of the Jones-Costigan amendment to the Agricultural Adjustment Act and the sugar quota regulations issued by the Secretary. The complainants contended that they had been discriminated against both under the provisions of the amendment and by the sugar regulations. The court in its decision sustained the validity of the amendment and upheld the action taken by the Secretary in determining the quotas for the sugar-producing areas. The court also held that the complaining companies had not only failed to prove any financial damage resulting from the amendment and the Secretary's action, but that they stand to gain by the enforcement of the act as amended.

2. *Franklin Process Co. v. Hoosac Mills Corp.*, D. C. Mass., Eq. No. 3926, Oct. 19, 1934.—Processing Taxes.

In this case a claim filed with the receivers by the United States for cotton floor stocks tax and cotton processing tax assessed under the Agricultural Adjustment Act was contested by the receivers on constitutional grounds. The court held the claim to be valid and held as follows: The floor stocks taxes and processing taxes are proper excises and meet the requirements of uniformity; the act is a genuine revenue measure and the proceeds of the taxes are appropriated for constitutional purposes; the act is not class legislation; the provisions of the act authorizing the Secretary to determine when a production-adjustment program will begin and to determine, from the standards prescribed in the act, rates of tax, do not unlawfully delegate legislative power to an administrative officer; the act does not constitute an unlawful attempt to legislate within the field of State powers and outside the powers granted to Congress by the Constitution; the act was an emergency measure and as such it must be treated; there is no denial of due process. An appeal is being taken from the final decree.

3. *Therrell v. Wallace et al.*, D. C. S. D., Miss., Nov. 20, 1934. Bankhead Act.

A cotton grower brought suit against the Secretary of Agriculture, various officials administering the Bankhead Act, the United States attorney and the collector of internal revenue, to obtain a declaratory judgment adjudicating unconstitutionality of the Bankhead Act. The court dismissed the bill as to the Secretary of Agriculture and the administrative officials, holding that jurisdiction could not be obtained over the Secretary out of the district of his residence without his consent, and that the administrative officials were not proper parties in the case in the absence of the Secretary. The court held that the Secretary was not an indispensable party to the suit against the United States attorney and the collector, and directed plaintiff to file an amended bill against them alleging further facts, the original bill being insufficient. The case is pending.

4. *United States v. Shissler et al.*, D. C. N. D., Ill., 1934 (Holly, D. J.) 7 Fed. (2d) 123.

The two defendant dairies having violated the price and other provisions of the Chicago milk license issued by the Secretary of Agricul-

ture under the authority vested in him by the Agricultural Adjustment Act, their licenses were revoked after a hearing by the Secretary. The defendants continued in business. Thereupon the Government filed a bill for injunction. After a hearing upon a preliminary injunction, the court upheld the constitutionality of section 8 (3) of the Agricultural Adjustment Act, and held the Chicago milk license to be valid and entered a preliminary injunction against the two dairies. No appeal was taken from the injunction.

5. *Hillsborough Packing Co., et al., v. Wallace*, D. C. S. D. of Florida, January 30, 1934.

A preliminary injunction was issued against the members of the Florida control committee, acting under a marketing agreement and license for citrus fruit grown in Florida, both executed pursuant to the Agricultural Adjustment Act. The committee was restrained from interfering with shipments by a shipper who had signed and a grower who had not signed an agreement, and from enforcing any regulation or agreement entered into pursuant to the act. The court in its opinion held that the Agricultural Adjustment Act was unconstitutional and the license void.

6. *Yarnell, et al., v. Hillsborough Packing Co.*, C. C. A. 5, Eq. No. 7309, Apr. 14, 1934. 70 Fed. (2d) 435.

In this case a circuit court of appeals, upon an appeal from the preliminary injunction issued by the district court, reversed the injunction and held that the constitutionality of neither the statute nor the license was properly presented to the lower court, and hence could not have been passed upon by the lower court. The court further held that an injunction does not lie merely because an act is unconstitutional, and one seeking such relief must show further that he is entitled to it on some clear ground of equity jurisdiction. Such ground was not shown here, for one petitioner was a voluntary party to a valid agreement, and the other one could not secure an injunction against a committee having no power to enforce its orders. Thus the circuit court of appeals did not pass on the constitutionality of any part of the Agricultural Adjustment Act.

7. *Edgewater Dairy Co. v. Wallace*, et al, D. C. N. D. Ill., Eq. No. 13878, June 26, 1934 (Barnes, D. J.). 7 Fed. (2d) 121.

In this case six dairies applied for a preliminary injunction against the enforcement of the Chicago milk license, and the Government filed its cross bill asking for an injunction against the six dairies from violating the terms and conditions of the Chicago milk license.

The court did not pass upon the constitutionality of the statute, but held the Chicago milk license to be void because, in its opinion, the Chicago milk license was an attempt by the Federal Government to regulate the production of milk, and that the production of milk is not interstate commerce. The district court granted the preliminary injunction in favor of the six dairies against the Government's enforcing the Chicago milk license and overruled the application of the Government for its injunction against the dairies.

The facts showed that the dairies produced and sold all of their milk in the State of Illinois, but the facts introduced by the Government showed that 40 percent of all milk consumed in the Chicago area is produced outside of the State of Illinois and shipped into Illinois and consumed in the Chicago sales area. There were further facts introduced by the Government upon which it rested its conten-

tion that the entire Chicago market is in the current of interstate commerce.

From the decision of the district court granting the injunction, the Government has taken an appeal to the circuit court of appeals for the Seventh Circuit, which is now pending.

8. *Columbus Milk Producers Cooperative Association et al. v. Henry A. Wallace et al.*, D. C. N. D. Ill., Eq. No. 13985, November 26, 1934.

In this case the Columbus Milk Producers Cooperative Association, together with its member producers of milk, being Wisconsin producers of milk, and the Meadowmoor Dairies, Inc., being a distributor of milk, filed their bill for an injunction against the enforcement of the Chicago milk license. The Government asked the court to enter a preliminary injunction against the association and the Meadowmoor Dairies, Inc., enjoining them from violating the terms and conditions of the Chicago milk license.

The court did not pass on the question of the constitutionality of the Agricultural Adjustment statute or the Chicago milk license. The court followed its own decision in the Edgewater case, and held that the Chicago milk license was an attempt to regulate production, and hence not interstate commerce and was therefore void. The court found, however, that the plaintiff association and the Meadowmoor Dairies, Inc., were engaged in interstate commerce, but that the Chicago milk market was not in the current of interstate commerce for the reason above stated.

There was a final hearing on the merits, and the court entered a final decree granting the injunction in favor of the dairies and denying the injunction requested by the Government. From this final decision the Government has taken its appeal to the circuit court of appeals for the seventh circuit.

9. *United States v. Neuendorf et al.*, D. C. S. D. Iowa, October 19, 1934.

In this case the Government sought to enjoin a dairy operating in Des Moines, Iowa, from continuing in business after the revocation of its license under the milk license for the Des Moines area. The Government's application for a preliminary injunction was denied on the ground that all the milk handled by the dairy was both produced and distributed within the State of Iowa, and that, hence, it was not in the current of interstate commerce. The court, therefore, held that the plaintiffs were not subject to the Des Moines milk license.

10. *United States v. Greenwood Dairy Farms, Inc.*, D. C. S. D. Ind., September 27, 1934.

In this case the Government filed a bill to enjoin a dairy operating in Indianapolis, Ind., from continuing to distribute milk after the revocation of its license under the milk license issued for the Indianapolis area. The case was submitted to the court for a final decree on affidavits and an agreed statement of facts. The court refused to grant the Government an injunction on the ground that all the milk handled by the dairy was both produced and distributed in Indiana, and that since the milk handled by the dairy was not in the current of interstate commerce, it was not bound by the Indianapolis milk license. An appeal from this decision is being taken to the circuit court of appeals for the seventh circuit.

11 and 12. *Hill v. Darger*, D. C. S. D. Cal., September 7, 1934, and *Kurtz v. Berdie*, D. C. S. D. Cal., September 7, 1934.

In *Hill v. Darger* the plaintiffs were Los Angeles dairies who sought to enjoin the holding of an administrative hearing to take evidence of alleged violations by the dairies of the Los Angeles milk license. In *Kurtz v. Berdie* the plaintiffs were Los Angeles dairies whose licenses had been revoked by the Secretary of Agriculture. They sought to enjoin the United States attorney and others from enforcing against them the penalties provided by the act for doing business without a license. Both cases were heard before Judge Cosgrave, who granted the plaintiffs preliminary injunctions on the theory that these dairies were not subject to the Los Angeles license because none of the milk which they handled moved in interstate commerce. These two cases are now pending on appeal before the circuit court of appeals for the ninth circuit.

13. *Douglas v. Wallace*, D. C. W. D. Okla., October 17, 1935.

In this case a bill was filed by several milk producers in the Oklahoma City market to enjoin the enforcement of the Oklahoma City milk license. It appeared that the plaintiffs produced all of their milk in Oklahoma and that all of it was distributed within that State. Judge Vaught held the Oklahoma City milk license unconstitutional on the ground that it was an unwarranted regulation of intrastate business.

14. *Royal Farms Dairy v. Henry A. Wallace et al.*, D. C. D. Md., November 16, 1934.

In this case a bill in equity was filed by a Baltimore dairy to enjoin enforcement against it of the Baltimore milk license. After a trial on the merits, Judge Chesnut granted the dairy a permanent injunction. The dairy distributed only milk produced in Maryland and because of this fact the court held that the milk it handled was not in the current of interstate commerce and that, therefore, the Baltimore milk license could not be applied to it. The court also held that the Baltimore milk license was invalid because it, in effect, contained a marketing plan instead of being limited merely to matters which may be referred to as "unfair practices or charges."

In all of the cases discussed above, it appeared that none of the milk handled by the dairies actually moved in interstate commerce. In the milk markets involved in these cases practically no fluid milk comes into the markets from other States, nor is any of the milk produced in these market areas transported out of the respective States in which they are located. The licensing of such milk markets as these under the Agricultural Adjustment Act is based on the theory that the price received by producers for their fluid milk in these markets is so interrelated with the price of butter, cheese, and other dairy products which move in interstate commerce, that the price of the former substantially affects the price and movements of dairy products in interstate commerce, and, hence, Federal regulation of the purchase of fluid milk from the producer for consumption in these milk sheds is legally justified.

This proposition was considered by the courts which decided the cases discussed above, but it was held untenable, in most cases, on the ground that the effect which fluid-milk prices in such markets have upon the interstate movement of dairy products is too indirect to be subject to regulation by the Federal Government.

15. *Mellwood Dairy et al. v. Sparks*, D. C. W. D. Ky., July 2, 1934.

In this case 13 dairies distributing milk in Louisville, Ky., filed a bill in equity to enjoin the United States attorney from enforcing the Louisville milk license against them. The court granted the dairies a preliminary injunction without rendering any opinion. The preliminary injunction was granted apparently on the theory that the Louisville milk license was not applicable to these dairies because they were not engaged in interstate commerce. Upon appeal the circuit court of appeals for the sixth circuit reversed the order of the district court granting the injunction, upon the grounds that the district court had failed to find that the plaintiff dairies would sustain irreparable injury if the injunction were not granted. The circuit court of appeals thus did not pass upon the question of constitutionality.

16. *Black et al. v. Little et al.*, D. C. E. D., Mich., November 1934.

In this case a bill in equity was filed by several dairies operating in cities of Flint, Bay City, and Saginaw, Mich., against the United States attorney and the market administrator of the milk license for this area. The plaintiffs sought to have the defendants enjoined from enforcing the milk license against them. The district court refused to grant the dairies a preliminary injunction. The court also denied the defendants' motion to dismiss the bill of complaint and held the case for trial as a suit for a declaratory judgment as to the validity of the milk license and the Agricultural Adjustment Act.

17. *Mefford, et al. v. Hunter et al. and United States v. Mefford*, D. C. S. D. Cal., October 18, 1934, Eq. No. 374-C and 399-C (Cosgrave, D. J.)

The plaintiffs, shippers of California citrus fruits, filed a bill to enjoin Federal officials from enforcing the provisions of the license for citrus fruits grown in the State of California against them. The United States filed an independent bill to enjoin these shippers from violating the license. Upon a consolidated hearing of the two cases, the court held that a preliminary injunction should issue, enjoining the Federal officials from enforcing the license in respect to shipments of citrus fruits made entirely within the State of California. However, it enjoined the shippers from shipping fruit from points within California to points outside of the State except in accordance with the terms and conditions specified in the license. In a subsequent proceeding, prosecuted in the State court against the same shippers, under the California Agricultural Adjustment Act, the State court entered a temporary injunction enjoining the shippers from violating any of the provisions of the license with respect to intrastate shipments of fruit. (*The People of the State of California v. Mefford*, Superior Court of California, Tulare County, Nov. 21, 1934, Allen, J.)

18. *United States v. Dwyer*, D. C. Mass.

The defendant dairy having violated the Boston milk license, the Secretary of Agriculture, after an administrative hearing, did, pursuant to the statute, revoke the license of the dairy. The dairy continued to do business; whereupon the Government filed its bill for injunction in the Federal court, and upon an application for a preliminary injunction the court restrained the dairy from doing an interstate business in milk pending the final determination of the merits of the case. The case has not yet been tried. No opinion was rendered.

19. *United States v. Dixie Rice Mill, Inc.*, D. C. W. D. La., July 30, 1934.

A bill was filed to require the performance by the Dixie Rice Mill, Inc., of the terms of a marketing agreement, issued pursuant to section 8 (2) of the Agricultural Adjustment statute, between it and other rice millers located in the States of Louisiana, Texas, Arkansas, and Tennessee and the Secretary of Agriculture. The defendant moved to dismiss the bill, but the court denied the motion and sustained the bill, stating in its opinion:

The very nature and scope of the plan to aid the rice industry along with other branches of agriculture in the act of Congress was such that the consequences of the failure of one party to the agreement to comply with it would be so far reaching that nothing short of specific performance, in my opinion, would adequately meet the situation. I don't think the percentage of the volume of the business done by the defendant makes any difference. The scheme is one which seems to require the unanimous and good-faith participation by the members of the industry; otherwise the failure of one encourages others to do likewise and discourages those who honestly try to live up to it, which would ultimately tend to lead to a collapse of the entire plan.

Thereafter a decree was entered on consent of all parties, granting the relief asked for by the Government.

20. *California Canning Peach Growers v. Myers*, D. C. N. D. Cal., November 13, 1934.

The plaintiff, being a canner of peaches, filed a bill in the Federal court to enjoin the officer appointed by the Secretary from proceeding in an administrative hearing, to determine whether the plaintiff's license should be suspended or revoked. The plaintiff had signed a marketing agreement with the Secretary of Agriculture pursuant to section 8 (2) of the act. The plaintiff sought to "surrender its license", and thus urged this as a basis for the injunction. The court denied the injunction and dismissed the bill. The court, in its opinion, did not pass on any constitutional question.

21. *United States v. H. T. Trunkey and Harry S. Wolfe*, D. C. E. D. Wash., December 1, 1934.

After an administrative hearing, the Secretary revoked the license of the defendants under the license for handlers of northwest deciduous tree fruits, for violations thereof. The United States thereupon instituted this suit to enjoin the defendants from doing business without a license. The defendants applied to the Secretary for reinstatement as licensees, and consented to the entry of an order permanently enjoining them from violating the license. This order was entered by the court, and the Secretary thereupon reinstated the defendants as licensees.

22. *United States v. Ameln*, D. C. E. D. Mo., December 19, 1934.

The United States filed this suit to enjoin the defendant, a milk distributor, from violating the license for milk—St. Louis sales area. Upon the hearing on the Government's motion for a preliminary injunction, the defendant agreed in open court to comply with the provisions of the license pending the trial of the case and the entry of a final decree. The case is now awaiting a trial on the merits.

**N. R. A. CASES INVOLVING CODES WHICH ARE JOINTLY
ADMINISTERED WITH THE A. A. A.**

1. *United States v. Joseph Schechter, et al.*, D. C. E. D. New York, August 28, 1934.

In this case the constitutionality of the National Industrial Recovery Act and the validity of the code of fair competition for the live poultry industry, metropolitan area of New York City, were in issue. The action was a criminal prosecution in which there were six defendants and was based upon an indictment in which the grand jury found that the defendants had conspired to violate the National Industrial Recovery Act and had committed numerous violations of the code. Upon demurrer to the indictment, Judge Marcus B. Campbell (district judge for the eastern district of New York) upheld the National Industrial Recovery Act and the code. The jury found the defendants guilty on 19 of the 33 separate counts submitted to it. Substantial fines were imposed against all of the defendants and sentences of imprisonment given the four individual defendants. The case is now in the process of being appealed to the Circuit Court of Appeals.

2. *United States v. Ross R. Salmon, et al.*, D. C. W. D. Mo., Equity No. 12613, July 23, 1934.

Indictment for violation of the Code of Fair Competition for the Commercial and Breeder Hatchery Industry through false and deceptive advertising and by substitution of chicks on sales where special qualities were advertised. All three defendants pleaded guilty on both counts and paid fines assessed by the court.

3. *United States v. Aurora Serum Co.*, D. C. N. D. Ill., Equity No. 14080, September 27, 1934.

Suit by the Government for injunction to prevent defendant corporation from violating the provision of the code of fair competition for the anti-hog-cholera serum and hog-cholera virus industry by selling serum at less than its schedule of prices filed with the code authority. The prospective purchaser was also made a party to the suit. The case was submitted on an agreed statement of facts, and the court entered a permanent injunction against the corporation prohibiting the sale. No opinion was rendered.

ADDITIONAL PENDING CASES

In addition to the foregoing cases in which opinions have been rendered or other action taken, a number of cases are now pending in which no action has as yet been taken by the courts.

1. A group of tobacco growers have filed a bill of complaint for a declaratory judgment in the Federal district court for the eastern district of Kentucky seeking to have the Kerr-Smith Tobacco Act declared unconstitutional. Similar suits have been filed in the district courts for the middle district of Tennessee and for the middle district of North Carolina.

2. The Government has filed proceedings to restrain violations of the license for southern rice millers with respect to which no enforcement proceedings have heretofore been instituted.

3. Three cases have been filed by the Government to enjoin violations of the Boston milk license, in addition to the case of *U. S. v. Dwyer* noted above.

4. A second suit seeking to enjoin a violation of the code of fair competition for the commercial and breeder hatchery industry has likewise been instituted.

5. Bills of complaint brought by milk distributors seeking to enjoin the enforcement of milk licenses issued by the Secretary of Agriculture for the Lexington, Ky., and Southern Illinois sales areas and by growers and shippers to enjoin enforcement of the license for handlers of California dried prunes, are also pending.

III. ENFORCEMENT OF LICENSES

The Agricultural Adjustment Administration has established definite procedure in obtaining compliance with licenses issued under the Agricultural Adjustment Act. Section 8 (3) of the act empowers the Secretary of Agriculture, after due notice and opportunity of hearing, to suspend or revoke the license of any person licensed under the act for violation of the terms or conditions of the license.

Detailed rules governing the procedure to suspend or revoke a license are contained in general regulations, series 3, issued by the Secretary and approved by the President on August 26, 1933. Under these regulations the alleged violators of a license may be served with an order to show cause which sets forth the specific charges against them and requires a written answer to the charges within a reasonable time. If the answer is not deemed sufficient by the Secretary, a public hearing is held, usually in the place where the licensee transacts his business. A presiding officer, designated by the Secretary to act for him, conducts the hearing.

On the basis of all the facts arising out of the public hearing, the Secretary makes his own findings of fact and passes an order either to dismiss the charges or suspend or revoke the license of the licensee, as the case may be. The Secretary is not empowered by the act to assess any fines or penalties against a license violator. It is only by transacting business without a license as required by the Secretary that a person becomes subject to the penalty prescribed by the act.

Although numerous complaints of license violations are made, there are many licenses which apparently have been operating very well, as evidenced by the fact that no formal complaints of violation of them have been received.

A number of the complaints are formal ones and are accompanied by data and evidence supporting the charges; some complaints are based on mere rumors or suspicions. All are taken seriously and given prompt attention by the Administration. Some complaints are so insignificant in character that they can be dealt with adequately in the field. Most of them, however, including all of the formal complaints, are referred to the Administration in Washington and after being docketed are dealt with from there. Almost all of these complaints require further investigation by the Administration before they can properly be made the basis of formal administrative action.

NEGOTIATION METHOD FREQUENTLY SUCCESSFUL

Negotiations conducted by lawyers and by representatives of the Administration in the field directly with the alleged violators, and in many instances through correspondence conducted from Washington, often bring about satisfactory solutions and assurances by the

licensees that they will observe the licenses in the future. Often a full explanation of the way in which the particular license affects their businesses and benefits them and references to the sanctions provided by law will suffice in bringing about compliance. In the majority of cases it is only after such means have failed that administrative action is taken.

The institution and conduct of these administrative cases have been motivated entirely by the desire of the Secretary to obtain compliance with the licenses. The chief value of the administrative hearings lies in their deterrent effect. The mere bringing of the proceedings against alleged violators in a particular market often restrains other licensees from engaging in violations. Many reported breaches of licenses are shown by the facts developed at the hearings to be due merely to misunderstanding of the program and of the operation of the license in question. The force of public opinion operating after the facts are disclosed at the public hearings plays a considerable part in bringing about compliance.

In some cases of violation, where satisfactory assurances of future compliance are given by the licensee, the Secretary may not exercise his powers of suspension or revocation, or where this already has been done, he may reinstate the licensee. The Secretary in some cases requires the license violator to execute and deliver a surety bond, conditioned upon future compliance with the license, as a condition precedent to clemency or to reinstatement.

The cancelation by the Secretary of some of the earlier milk licenses accounts in large measure for the number of administrative cases instituted, and in some cases heard, which were not formally concluded. Almost all other cases where administrative proceedings have been suspended before completion and still remain open on the docket are accounted for by decisions by United States district courts adverse to the Secretary in similar cases, or by the pendency of such court litigation.

Of 23 formal administrative enforcement cases recently instituted by the Secretary, 1 under the California canning peach license, 8 under the Northwest deciduous tree fruit license, and 3 under the Port Huron, Mich., milk license, have been heard and are now awaiting decision by the Secretary, and 4 under the Southern rice license, 3 under the Kalamazoo milk license, 1 under the Sioux City, Iowa, milk license, and 3 under the Boston milk license will be scheduled for hearing in the near future.

ENFORCEMENT OF MILK LICENSES

Under the milk licenses a total of 460 formal complaints docketed have arisen under 29 of the 49 milk licenses issued, but the greater number have been reported from 5 large metropolitan milk centers, as follows: From Chicago, 243; from Philadelphia, 25; from Boston, 56; from Los Angeles, 33; and from St. Louis, 23.

Most of these concerned violations of the first milk licenses issued for these markets, which have since been terminated by the Secretary. In Chicago, for example, approximately 150 of the complaints arose under the first Chicago milk license and uniformly involved violation of the retail price schedules incorporated in that license. Under the present Chicago license, issued February 1, 1934, substantial compliance has been obtained in spite of resistance to the license on the part

of certain distributors and despite 3 comparatively recent United States District Court decisions, 2 by Judge Barnes holding the license invalid, and the other by Judge Holly, holding it valid.

A total of 223 formal license-revocation cases involving handlers of milk have been instituted by the Secretary. Public hearings have been held in 173 of the cases. Of the 50 cases in which hearings have not been held, 7 are awaiting hearing in the near future; 11 have been dismissed because of later compliance by the offending parties; 12 have been held in abeyance because of promises of compliance; 1 has become moot—that is, necessity for decision has been removed—because the license under which it was brought was later terminated by the Secretary; and 19 have been held in abeyance for the time being because of the presence of adverse court decisions in the same or similar cases in the same jurisdiction or by the pendency of such court litigation.

Of the 173 cases under milk licenses in which hearings have been held, 1 has been dismissed because the charges have proved to be unfounded; 25 have been held in abeyance because of compliance by the offending parties; 108 have been rendered moot because the license under which they were brought was later terminated by the Secretary; 12 have been held in abeyance for the time being without a concluding order by the Secretary because of the presence of adverse court decisions in the same or similar cases in the same jurisdiction or by the pendency of such court litigation; 26 have resulted in formal orders by the Secretary revoking or suspending the licenses or making formal findings of serious violations.

LICENSES COVERING FRUITS, RICE, AND GENERAL CROPS

Under the licenses which have been issued covering the handling of fruits, rice, and general crops, as distinguished from milk, the status of administrative enforcement proceedings is as follows:

A total of 116 formal complaints arising under 9 licenses out of the 28 issued have been docketed at Washington, D. C., as follows: 30 under the two licenses covering the handling of California cling peaches; 31 under the Florida citrus licenses; 19 under the Southern rice license; 19 under the Northwest deciduous tree fruit license; 13 under the California citrus license; 2 under the Texas citrus license; 1 under the walnut license, and 1 under the Tokay grapes license.

A great many violators of these licenses were induced to abide by the licenses without institution of formal proceedings against them. For example, there were 23 such instances under the first California cling peach license, a number of which involved infringement in the nature of small overpacks, and 20 such instances under the license covering shippers of Florida citrus. In a number of instances complaints have only recently been docketed and the facts pertaining to them are still in the process of being investigated. This observation applies particularly to 12 complaints recently filed alleging violations of the southern rice license and which are now in the process of being investigated before the institution of formal proceedings.

A total of 41 formal revocation cases have been instituted by the issuance by the Secretary of orders to show cause against violators of licenses covering handlers of fruit, rice, and general crops. In 33 of these cases, hearings have been held. Of the 8 cases in which hear-

ings have not been held, 4 are awaiting hearing in the near future; 1 has been dismissed because of later compliance by the offending party; 1 has been held in abeyance because of promises of compliance on the part of the offending party; and 2 have been rendered moot because the violators have been restrained by the Federal courts from violating the licenses.

Of the 33 such cases in which hearings have been held, 12 are now awaiting decision by the Secretary; 1 has been dismissed because the charge appeared to be unfounded; 2 have been dismissed because of later compliance by the offending parties; 2 have been held in abeyance because of assurances of compliance by the offending parties; and 16 have resulted in the issuance of formal orders by the Secretary revoking or suspending the licenses or making formal findings of serious violations. In 4 of these 16 last-mentioned cases, the respondent has been reinstated as a licensee after having given assurances of future compliance.

IV. CASES INVOLVING PRODUCTION—ADJUSTMENT AND EMERGENCY—PURCHASE PROGRAMS

An important aspect of the legal work of the Agricultural Adjustment Administration has been that concerned with seeing that benefit-payment checks are transmitted to the producers for whom they are intended, and are not diverted by creditors or, in more fraudulent fashion, by embezzlement or other violation of contractual obligations.

First is considered the attempt of creditors to interfere with the transmission of benefit-payment checks to the producer. Attempts to tie up a check may be made pending the outcome of the suit which the creditor is bringing on his debt, or, more frequently, the creditor may attempt to levy upon the check in satisfaction of a judgment he has already obtained. The attempt to satisfy a judgment by attachment of a benefit-payment check may or may not be formally a part of the main action where the creditor sues to collect his debt. The court process which actually issues will go under the name of attachment, garnishment, execution, restraining order, petition, claim, etc., depending upon the circumstances and upon the law of the particular State. In each case there is involved, basically, an attempt by creditor to divert to his own use a benefit-payment check destined, under the policy of the Agricultural Adjustment Act and by the terms of the benefit-payment contract, for the producer. Considerable point may also be made of the fact that turning the Agricultural Adjustment Administration into a collection agency for creditors is bound to impede the efficiency of administering the benefit-payment program.

There have been 77 such cases recorded in the office of the general counsel as of January 1, 1935. In almost all of these cases the court process ran against the county agent, although in a few cases garnishment or attachment was directed against the treasurer of the county production-control association or the secretary of the county committee if those were the agencies charged with the function of distributing checks. The procedure in these matters involves careful investigation by the office of the general counsel and a preliminary attempt to settle the matter amicably by writing to the county agent or the attorney for the creditor, either or both of whom have originally

referred the matter to the Washington office of the Agricultural Adjustment Administration. After the facts are carefully collated and analyzed, and in the event that the matter has not been settled by mutual arrangement, the case is referred to the Department of Justice, which then instructs the local United States district attorney to collaborate with the local representative of the Agricultural Adjustment Administration and intervene in behalf of the debtor-producer.

The returns have been uniformly satisfactory. In the 77 above-mentioned cases the following results were obtained:

Dismissed by court on motion of the United States district attorney-----	32
Disposed of by voluntary agreement of parties as a result of writing to county agent or the attorney for the creditor-----	14
Pending or information not available-----	31

The 31 cases described as "Pending or information not available" are in large measure attributable to the fact that settlements or adjustments of attachment proceedings may not always be reported to the Agricultural Adjustment Administration and that reasonable time must be allowed for investigation by the Agricultural Adjustment Administration and action by the Department of Justice.

In only one of these cases was an appeal taken from the trial court's order of dismissal, that case being *Works & Rhea v. Shaw*, which was appealed to the Court of Appeals of Louisiana, second circuit (156 So. 81, 82 (1934)). The appellate court said:

So long as money remains in the hands of a disbursing officer, it is as much the money of the United States, as if it had not been drawn from the Treasury. Until paid over by the agent of the Government to the person entitled to it, the fund cannot, in any legal sense, be considered a part of his effects.

* * * * *

The Agricultural Adjustment Act is not a private act, but is one of national scope and purpose, which purpose would be utterly defeated if the funds offered in consideration of the plowing up of the crop are subject to garnishment in the hands of the Government for the debts of the farmer. There can be no question that in the present case the possession of its agent is the possession of the Government.

Another type of proceeding in State courts involving claims of creditors to benefit payment checks is State receiverships. In theory, State receivers are appointed in behalf of the general creditors of the debtor, but in practice it may happen that the debtor has only one creditor. The same administrative and legal considerations obtain as in the case of garnishments or attachments by individuals. Of 14 cases reported to the Agricultural Adjustment Administration as of January 1, 1935, where a court order was addressed to the county agent directing him to pay over the benefit-payment check due a producer to the receiver appointed by the court, 2 were referred to the Department of Justice and, by the collaboration of the local agency of this Administration and the United States District Attorney, the order was modified so as to eliminate any reference to benefit-payment checks. In 1 case the matter was adjusted without reference to the Department of Justice, and 11 cases were still pending awaiting further analysis by the Agricultural Adjustment Administration or action by the Department of Justice. The pending cases are, for the most part, of very recent origin, but it is expected that they will be settled promptly and favorably to the Administration.

The significance of these 90 odd cases is greater than may at first sight appear. The almost unanimously favorable response of the courts to the claim of the Agricultural Adjustment Administration that checks should reach the producer with whom the contract was drawn has meant that many creditors, disillusioned by this attitude of the courts, have not contested the right of the Administration to transmit its checks unimpeded to the producer. Attempts on the part of creditors to lay claim to benefit-payment checks will no doubt continue, but the Administration has by now established a policy of vigorous action in behalf of the contracting producer in this regard.

CRIMINAL PROSECUTIONS IN CONNECTION WITH ACREAGE-REDUCTION AND EMERGENCY-PURCHASE PROGRAMS

At the request of the Secretary of Agriculture, a number of criminal prosecutions have been instituted for frauds committed in connection with the acreage-reduction and emergency-purchase programs undertaken pursuant to the Agricultural Adjustment Act. These prosecutions, for the most part, were instituted under section 88 of the Criminal Code for conspiracy to defraud the United States, sections 72, 73, and 80 of the Criminal Code for the falsification of records with the intent to defraud the United States, or under section 10 of the Federal Trade Commission Act (which is made a part of the Agricultural Adjustment Act) which imposes penalties of fine and imprisonment for the willful making of false entries or statements in any report required under the Agricultural Adjustment Act.

Indictments in connection with acreage-reduction programs were returned against persons who had made false representations in their applications for benefit contracts, had made false certificates in claims for benefit payments, had forged checks, or had violated the criminal laws in other particulars for the purpose of obtaining benefits under these programs. Indictments in connection with the emergency hog program have been returned against persons who have falsely represented that they raised the hogs which they offered for sale to the Government. The details of the indictments which have already been returned are indicated below.

CORN-HOG PROGRAM

U. S. v. Walter R. Korthas (U. S. D. C. for D. of Colorado). Indictment was returned on September 19, 1934, and upon a plea of guilty, sentence of 18 months in the penitentiary was imposed on September 29, 1934.

U. S. v. Louis K. Wyckoff (U. S. D. C. for N. D. of Indiana, South Bend div.). An indictment was returned in October 1934 and the case is now awaiting trial upon the defendant's plea of *nolo contendere*.

EMERGENCY HOG-PURCHASE PROGRAM

U. S. v. Raymond Marker (U. S. D. C. for S. D. of Ohio). Indictment was returned on May 7, 1934, and the case is now awaiting trial.

U. S. v. Maddox and Sparkman (U. S. D. C. for E. D. of Oklahoma). Indictment was returned on May 9, 1934, for conspiracy to defraud the Government, and the case is now awaiting trial.

U. S. v. Fred M. Hartley et al. (U. S. D. C. for N. D. of Oklahoma). Indictment for conspiracy to defraud the Government was returned in March 1934 and is pending upon the defendants' demurrer to the indictment.

COTTON-ADJUSTMENT PROGRAM

U. S. v. Eric V. Hoyt (U. S. D. C. for E. D. of Arkansas). Indictment was returned in November 1934 and the case will be tried at the May 1935 term of court.

U. S. v. John C. Ingram (U. S. D. C. for W. D. of Arkansas). Indictment was returned September 1934 and is now awaiting trial.

U. S. v. Andy Wheeler et al. (U. S. D. C. for E. D. of Missouri). Indictments were returned in March 1934. The charges were nolle prossed as to certain of the defendants. Upon the trial on October 10, defendant Andy Wheeler was sentenced for 2-year terms on each of two indictments and for a 6-month term for the third. His son Jeff was sentenced to 3 months in the State penal institution. A third defendant, H. T. Wheeler, had not been apprehended at the time of the trial. He has since been apprehended and the case, as to him, will probably be tried at the April 1935 term of court. Andy Wheeler was a member of the county committee during the plow-up campaign of 1933.

WHEAT-ADJUSTMENT PROGRAM

U. S. v. Louis K. Wyckoff (U. S. D. C. for N. D. of Indiana). The indictment was returned in October 1934 charging, among other things, that the defendant, as president and a member of the county allotment committee, made false certifications of applications for benefit contracts. The case is now awaiting trial.

V. ECONOMIC BASIS FOR LEGAL ACTION UNDER THE AGRICULTURAL ADJUSTMENT ACT

Since the Agricultural Adjustment Act is designed to achieve certain economic results, both in its parts and as a whole, its economic justification becomes of first importance from a legal standpoint. In proportion as any part of the act rests on a weak economic foundation, it will be open to legal attack. This throws a great responsibility on the economist to set up foundations of economic fact as nearly impregnable as they can be made. But back of the economist is the farmer, whose interests the act is designed to safeguard and promote. If, for example, a group of producers desires a certain marketing agreement, it is vital that their demand should rest on stout economic underpinnings.

ECONOMIC DATA SUPPORT LITIGATION

Many of the powers of the Secretary under the act can be lawfully exercised only if his action tends to effectuate the declared policy of the act. This in turn requires a showing, if and when litigation arises testing the legality of the Secretary's action, that the economic facts are such that his action did, in fact, tend to effectuate the declared policy. Adequate economic data are also frequently necessary to sustain provisions of the act against attacks on the ground of unconstitutionality.

In its opinion in the case of *Borden v. Baldwin*, decided December 3, 1934, the Supreme Court indicated the increasing importance of economic data in cases affecting the kind of legislation which includes the Agricultural Adjustment Act, although, of course, that act was not mentioned in that opinion. The court said, in effect, that while it will take judicial notice of certain economic facts—that is, it will consider those facts even though they have not been proved in the lower court by witnesses—yet the facts of which it will take judicial notice must be matters of common knowledge and beyond dispute, and the sources of information must be shown to be reputable and authentic.

The legal staff of the Agricultural Adjustment Administration, then, in giving opinions as to the validity of proposed action by the Secretary, and in defending acts of the Secretary when litigation arises, is required to rely upon economic data prepared by the Agricultural Adjustment Administration economists. This might be illustrated by a discussion of what happens in the case of licensing provisions.

A legal opinion given at the time of the issuance of a license, as to whether it is valid and enforceable, means little more or less than a lawyer's conjecture as to whether the courts will enforce the provisions of the license.

This conjecture on the part of the general counsel's office must be based upon the facts presented by economists. In most cases the lawyers must rely upon the statement from the economist. If, on the face of this statement, the provisions of the license appear to be economically justifiable within the declared policy of the act, then the lawyer's opinion will be to the effect that the license is valid. The lawyer's guess is a conditional opinion. It says, in effect, that if the facts presented by the economist are correct then the license is valid.

LAWYERS MUST HAVE ALL THE EVIDENCE

When the license actually comes into litigation, the lawyers who handle the lawsuit must be in possession of evidence in accord with what had previously been told them by the economist at the time of the issuance of the license. If this evidence is not then forthcoming, or in other words, if the facts, as brought out in the lawsuit, show that the provisions of the license are unreasonable (that is, economically unjustifiable) then the lawsuit will be lost, the enforcement of the license will prove impossible, and unfortunate consequences to the farmers and others interested will ensue.

The economist, then, should be zealous to give a full and complete picture. But this is not for the sake of the lawyers. Their opinion, as above stated, is conditioned upon the assumption that the facts stated by the economist are full, correct, and complete.

The full development by the economists of all the economic facts bearing on the reasonableness or unreasonableness of licenses and agreements is therefore vital to the interests of those chiefly concerned, which means primarily the farmers.

CHAPTER 19

HOW FARM DOLLARS AID BUSINESS

SALIENT FACTS

1. Cash income from crops in 10 States of the Southeast (south of the Ohio and Potomac Rivers and east of the Mississippi):	
In year ending June 30, 1933-----	\$451, 637, 000
In year ending June 30, 1934-----	\$722, 017, 000
Percent increase-----	59. 9
2. Shipments of industrial commodities (excluding coal) to the same States from 16 industrial States of the Northeast (north of the Ohio and Potomac Rivers and east of the Mississippi), over 4 important railroads:	
In year ending June 30, 1933-----pounds--	2, 104, 585, 201
In year ending June 30, 1934-----do-----	2, 920, 887, 439
Percent increase-----	38. 8
3. Percent increase in shipments of:	
Goods used principally by farmers, from and to the same States and over the same railroads, in year ending June 30, 1934, over the year ending June 30, 1933-----	75. 1
Domestic and personal goods-----	57. 6
Goods used in industry and commerce-----	43. 2
Commodities used generally in industry, on farms and in homes (excluding coal)-----	31. 3

Next to bringing a measure of economic justice to farmers, the principal reason for the Agricultural Adjustment program is to promote national recovery by restoring the farm market for industrial goods.

Do the new dollars placed in farmers' hands find their way back to the industrial centers?

The Agricultural Adjustment Administration wanted to know the answer to this question. For if these dollars really do go back to the cities, they must create new employment and business activity, causing the productive facilities of the country to be used at more nearly their maximum capacity and leading to the production of more wealth for everyone. This would be an approach to a balanced abundance.

Available statistics of a general nature have indicated that since the spring of 1933 more goods were being sold to people in the rural districts; but detailed figures, broken down by commodities and by States and cities of origin, were lacking. These were not to be had through any of the regular agencies engaged in gathering statistics, nor could they be supplied by trade associations, chambers of commerce or even the individual manufacturers themselves.

The best way to measure the effect of the farm program, it was decided, was to measure the shipments of industrial commodities into regions where agriculture is the most important industry and where the farm adjustment program has been carried on most intensively.

I. COMMODITIES SHIPPED INTO SOUTHEASTERN UNITED STATES

A special survey has, therefore, been carried on by the Agricultural Adjustment Administration to determine the amounts of industrial commodities shipped into 10 States of the agricultural southeast from 16 States of the industrial northeast. With the cooperation of four of the most important railway systems in the southeast—the Southern Railway System, the Central of Georgia Railroad, the Louisville and Nashville Railroad, and the Illinois Central Railroad—their waybills were examined to obtain the totals of industrial commodities shipped during two successive periods of 1 year each. The first year, beginning July 1, 1932, and ending June 30, 1933, preceded the actual launching of the Agricultural Adjustment program. The second year, beginning July 1, 1933, and ending June 30, 1934, covered a period when results of the program had begun to be felt.

The 10 States in which the industrial commodities were delivered were Virginia, North Carolina, South Carolina, Georgia, Florida, Alabama, Mississippi, Tennessee, Kentucky, and West Virginia.

The 16 States from which they were shipped were Maine, New Hampshire, Vermont, Massachusetts, Connecticut, Rhode Island, New York, Pennsylvania, New Jersey, Delaware, Maryland, Ohio, Michigan, Indiana, Illinois, and Wisconsin.

Figure 25 shows the Northeastern industrial area, the Southeastern agricultural area, and the network of railroads, waybills of which were studied.

INCREASE IN FARM CASH INCOME

During the first period, July 1932 through June 1933, the cash income from crops in the 10 Southeastern States was \$451,637,000. During the second period, July 1933 through June 1934, the cash income from crops plus benefit payments in those States was \$722,017,000, an increase of 59.9 percent.

The cash income of these States during the two periods of the survey is given in table 51.

TABLE 51.—Cash income from crops and benefit payments

	July 1932 to June 1933	July 1933 to June 1934		July 1932 to June 1933	July 1933 to June 1934
Virginia.....	\$29,454,000	\$46,973,000	Mississippi.....	\$55,343,000	\$89,364,000
North Carolina.....	81,165,000	159,695,000	Tennessee.....	39,487,000	60,693,000
South Carolina.....	40,699,000	72,310,000	Kentucky.....	40,317,000	45,966,000
Georgia.....	49,673,000	101,668,000	West Virginia.....	6,159,000	7,771,000
Florida.....	62,197,000	57,937,000			
Alabama.....	47,146,000	79,640,000	Total.....	451,637,000	722,017,000

CARLOT SHIPMENTS MEASURED

Only carlot shipments were included in the commodity survey, because less-than-carlot shipments could not be definitely traced to

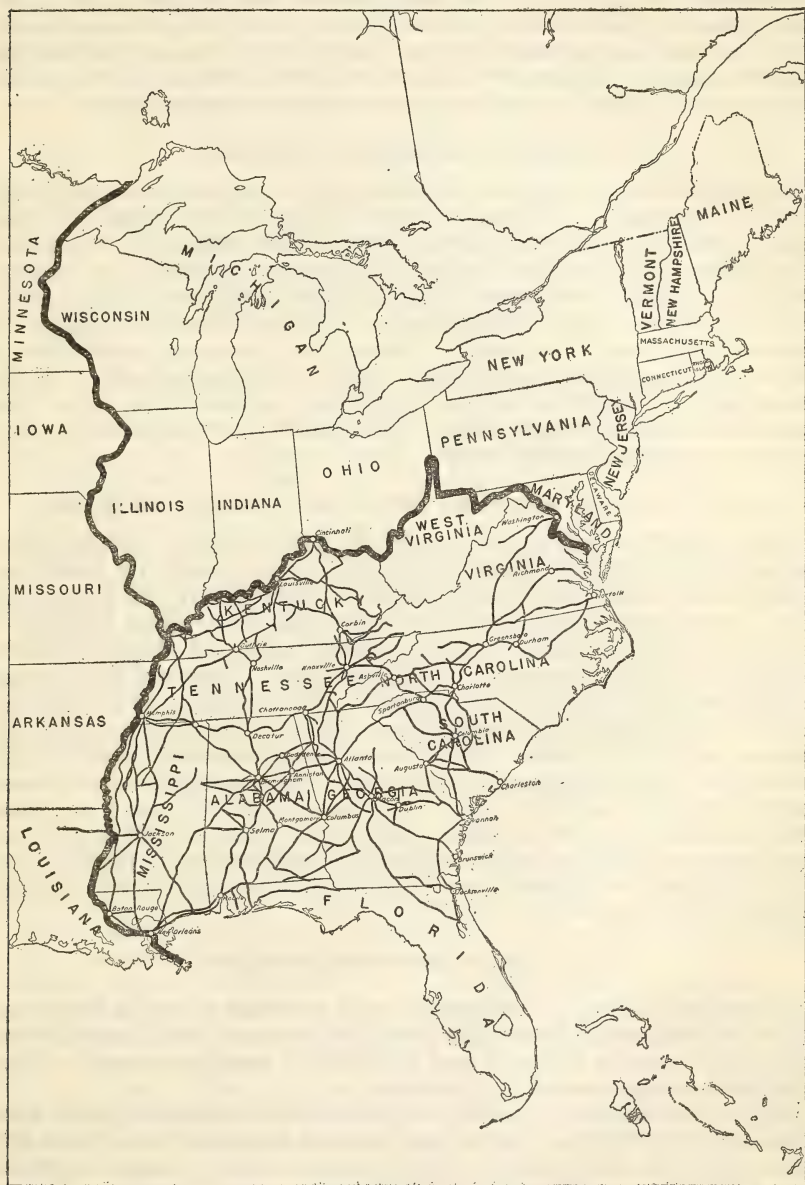


FIGURE 25.—Area covered by the commodity-shipments survey, showing the Northeastern industrial States, the Southeastern agricultural States, and the railroads of which waybills were studied.

the point of manufacture. The carlot shipments, however, represent more than 95 percent of the total weight of shipments.

Among the commodities for which figures were compiled were manufactured goods (including a limited number of prepared foods in the semiluxury class) and the products of mines and forests. Figures were compiled also for hogs, horses, mules, sheep, and other farm animals, which being shipped from the North to the South, would logically be intended to supplement the foundation stock on southern farms. Cotton and tobacco shipped from the North to the South were included, but other farm products were excluded.

GENERAL INCREASE 38.8 PERCENT

Results of the survey for all industrial commodities except coal show an increase in shipments from 2,104,585,201 pounds during year 1 to 2,920,887,439 pounds in year 2, an increase of 38.8 percent.

Including coal, the grand total of shipments in year 2 was 4,063,928,166 pounds, as compared with 3,295,161,485 pounds in year 1. This represents a gain of 23.3 percent. Coal shipments declined 3.9 percent from year 1 to year 2. Since they represent more than a billion pounds in weight each year, they have a marked effect on the percentage of increase for all industrial commodities. For this reason the figures perhaps reflect the situation more accurately when coal is not included in the totals.

GOODS USED BY FARMERS SHOW 75.1 PERCENT INCREASE

Many specific commodities, especially those used by farmers, show increases much larger than the average. Shipments of farm machinery and farm implements, which totaled 8,561,267 pounds in year 1, were 26,005,604 pounds—or more than three times as much—in year 2. Wagons and wagon wheels increased from 2,073,868 pounds to 4,755,056 pounds, or 129.3 percent. Tractors and tractor parts increased from 6,707,115 to 9,007,672 pounds, or 34.3 percent. Harness and saddlery increased from 1,192,178 pounds to 2,520,707 pounds, or 111.4 percent. Steel fence posts increased from 182,007 pounds to 374,313 pounds, or 105 percent. Wire and fencing increased from 37,538,337 pounds to 56,442,834 pounds, or 50.4 percent. Beehives increased by 251.5 percent, and corn cribs by 301.5 percent. The aggregate for the commodities used primarily by farmers was 61,417,753 pounds in year 1 and 107,562,369 pounds in year 2, or an increase of 75.1 percent.

INCREASE IN HOUSEHOLD GOODS

Shipments falling in the domestic and personal group, a large portion of which would inevitably find their way to farm homes, were 115,649,678 pounds in year 1 and 182,308,112 pounds in year 2. This represents an increase of 57.6 percent.

Increases in almost all kinds of furniture and household goods were especially impressive. Stoves and heaters increased from 6,251,271 pounds to 11,481,799 pounds, or 83.7 percent. Refrigerators increased from 4,629,050 pounds to 11,512,361 pounds, or 148.7 percent. Tables increased from 24,000 pounds to 266,560 pounds, or 1,010.7 percent, and chairs from 320,551 pounds to 708,646 pounds, or 121.1 percent. Sewing machines increased from 76,515 pounds to 215,920 pounds, or 182.2 percent. Cabinets and kitchen cabinets increased from 854,106

pounds to 1,922,700 pounds, or 125.1 percent, while bookcases and desks showed a 79.1 percent increase. Electric lamps and fixtures increased from 463,066 pounds to 857,642 pounds, or 85 percent, and radios and radio parts increased from 318,670 pounds to 540,331 pounds, or 69.6 percent. Miscellaneous furniture increased from 7,699,575 pounds to 10,813,699 pounds, or 40.4 percent.

There was a 137.2 percent increase in bedding, shipments of which were 361,013 pounds the first year and 856,458 pounds the second. Carpets and linoleum increased from 4,423,932 pounds to 6,610,815 pounds, or 49.4 percent. Plumbers' ware and bathtubs showed a 29.4 percent increase, from 3,756,860 pounds to 4,860,175 pounds. Furnaces increased from 816,032 pounds to 2,101,198 pounds, or 157.5 percent. Electrical appliances increased 26 percent, from 577,511 pounds to 729,011 pounds. Woolen blankets increased from 1,926,327 pounds to 2,484,031 pounds, or 29 percent, while cotton piece goods and batting increased from 5,046,751 pounds to 5,475,555 pounds, or 7.9 percent.

DISHES AND KITCHEN UTENSILS IN DEMAND

Dishes showed an increase of 39.6 percent from 203,700 pounds to 284,386 pounds. Kitchen utensils showed similar gains.

Lawn mowers increased from 251,894 pounds to 542,713 pounds, or 115.5 percent.

Shipments of matches were more than doubled, increasing from 3,909,634 pounds to 7,973,280 pounds, while the amount of shoe polish delivered in year 2 was more than 10 times as great as in year 1, increasing from 51,195 pounds to 545,123 pounds.

Because much of the textile manufacturing industry has removed to the South, shipments of clothing from the North are of relatively less importance than some other items. Caps, however, showed an increase from 140,589 pounds to 220,575 pounds, and miscellaneous clothing increased from 235,164 pounds to 469,415 pounds.

VARYING RESULTS FOR PREPARED FOOD

The prepared foods for which figures were compiled showed varying results. Increases were revealed as follows: Cereals, 10 percent; sauces and extracts, 12 percent; spaghetti, 22.4 percent; and tapioca, 113.6 percent. Cereal beverages, which no longer included large amounts of near beer, decreased by 11.9 percent. Confectionery showed a decrease of 6 percent.

The beverage classification, as was to be expected after the repeal of prohibition, revealed striking increases. Beer increased from 14,665,475 pounds to 34,416,669 pounds, or 134.7 percent. Other liquor increased from 2,962,993 pounds to 10,198,637 pounds, or 244.2 percent. Demand for nonalcoholic beverages also increased, for shipments of fruit and vegetable juices, which totaled 1,791,474 pounds in year 1, amounted to 4,952,318 in year 2, or 176.5 percent more. Ginger ale and other beverages increased from 3,243,001 pounds to 6,559,407 pounds, or 102.3 percent.

SHIPMENTS OF TOILET PREPARATIONS INCREASED

Toilet preparations evidently were in much greater use in year 2 than in year 1, because the shipments of these products increased by 56.8 percent, from 1,176,876 to 1,844,872 pounds.

Shipments of arms and ammunition, which totaled 3,216,285 pounds in year 1, were 6,238,195 pounds, or 94 percent more, in year 2. Targets showed an increase of 254.8 percent, from 63,590 to 225,608 pounds.

Roller skates increased from 121,575 to 169,876 pounds or 39.7 percent, while miscellaneous toys increased from 304,072 to 493,615 pounds, or 62.1 percent.

That much more money was spent on burials is evidenced by the figures for caskets and undertakers' supplies, shipments of which increased by 345.5 percent, from 55,699 to 248,164 pounds.

Not only did shipments of products used on farms and in homes increase; shipments of products used in industry and commerce were 43.4 percent greater in year 2 than in year 1, increasing from 827,180-499 to 1,185,937,766 pounds.

STEEL AND IRON SHIPMENTS INCREASE 113 PERCENT

The most important commodity in the industrial and commercial groups was steel and iron, which increased from 195,340,434 to 416,063,259 pounds, or 113 percent. Next in importance was commercial and industrial machinery, which increased by 41.1 percent, from 52,949,819 to 74,705,580 pounds. Electrical machinery increased by 275.6 percent, from 1,230,464 to 4,621,024 pounds, and refrigerating machinery and equipment increased by 101 percent, from 4,772,933 to 9,595,151 pounds. Road machinery increased by 31.8 percent. Machine parts increased by 94 percent from 2,738,818 to 5,314,287 pounds.

Boilers and parts increased from 4,692,794 to 10,002,323 pounds, or 113.1 percent. Miscellaneous engines increased from 9,920,823 to 15,151,370 pounds, or 52.7 percent. Tools and equipment increased from 1,795,998 to 3,708,253 pounds or 106.5 percent, while contractors' equipment increased from 5,384,172 to 5,843,646 pounds, or 8.5 percent. Cables increased by 117.4 percent, elevators by 912.2 percent, sales and parts by 161.8 percent, and air filters and blowers by 199.7 percent.

METAL FURNITURE SHOWS BIG JUMP

Of commercial equipment, the most important item, metal furniture, increased from 513,580 pounds to 1,179,474 pounds, or 129.7 percent. Mechanical stokers increased by 221.1 percent, from 391,124 pounds to 1,255,753 pounds. Theater chairs increased by 36.8 percent, from 122,884 pounds to 168,110 pounds. Hose increased by 367 percent, from 61,982 pounds to 289,466 pounds. Cafe equipment, counters, fire apparatus, and switchboards all showed striking increases, but canvas baskets decreased.

Statistics on industrial materials and supplies show 23 items increasing and only 3 decreasing. Those which increased were: Abrasives, animal hair, felt and carpeting, cloth, clothing loops, cork, cotton, cotton factory supplies, glue and sizing, graphite, hides and pelts, malt and malt sirup, fish and animal oils, tanners' extracts and oils, miscellaneous vegetable oils, ore, rayon, sea moss, sponge, waste and sweepings, tallow, yarn and thread, and tobacco. Those which decreased were bagging and burlap, bottle caps, and spinning fiber.

BUILDING MATERIALS GAIN

Building and construction materials for the most part show increases though the largest item, cement and concrete, decreased by 6.4 percent, from 169,983,325 pounds to 159,183,279 pounds. Shipments of cement were heavy during April, May, and June of 1933. Later, early in 1934, cement plants in the South which had been closed down resumed operations.

Asphalt and products, including paving blocks and roofing, increased by 20.5 percent, from 115,605,033 pounds to 139,263,584 pounds. Bricks increased by 72 percent, from 14,613,092 pounds to 25,138,171 pounds. Lumber and products, which totaled 21,119,657 pounds the first year, increased by 18.7 percent to 24,983,807 pounds in year 2. Plaster, lime, sand, and building stone and marble increased, but shingles, tar, and pitch decreased.

Other commodities used in building which showed increases were asbestos, 58.5 percent, and insulation, 101.1 percent.

Of nonferrous metals and metal goods, zinc made the best showing, increasing by 277.3 percent, from 726,054 pounds in year 1 to 2,739,715 in year 2. Copper and brass goods increased by 49.5 percent, from 5,840,497 pounds to 8,731,422 pounds. Aluminum, on the other hand, decreased by 9.2 percent, and lead, including lead pipe, was down by 15.9 percent.

AUTOMOBILE INCREASE 63 PERCENT

Shipments of commodities used generally in industry, on farms, and in homes increased by 13 percent, from 2,290,313,555 pounds to 2,588,220,164 pounds. With coal omitted, however, this group showed an increase of 31.3 percent.

Automobiles and automobile parts and accessories made an impressive showing, with an increase of 63 percent from 267,317,944 pounds to 435,672,725 pounds. Trucks increased by 9.1 percent, from 5,535,934 pounds to 6,041,306 pounds.

Gasoline, oil and other petroleum products increased by 3.5 percent, from 334,475,220 pounds to 346,199,882 pounds. Shipments of anti-freeze were more than 12 times as great in year 2 as in year 1, increasing from 87,500 pounds to 1,073,136 pounds.

Airplanes and parts were up to 468.5 percent, increasing from 32,400 pounds to 184,200 pounds. Bicycles, motorcycles, and velocipedes showed an increase of 105.5 percent, from 210,197 to 431,856 pounds.

Paper and paper products increased from 134,521,336 pounds to 178,600,653 pounds, or 32.8 percent. Magazines, books, catalogs, and other advertising matter increased from 4,211,410 pounds to 5,677,816 pounds, or 34.8 percent, indicating that publishing and advertising were feeling the prosperity wave.

School supplies, along with organs and equipment, increased, but school furniture and hospital supplies decreased.

HEAVIER SHIPMENTS OF CHEMICALS, GLASS, RUBBER, LEATHER AND PAINT

Supplies and equipment of general utility showed striking increases. Drugs and chemicals were up by 25 percent, from 115,574,895 pounds to 144,424,797 pounds. Glass and glassware increased from

51,905,656 pounds to 84,808,995 pounds, or 63.4 percent. Rubber and rubber goods increased from 1,023,061 pounds to 2,732,369 pounds, or 167.1 percent. Leather and leather goods increased from 3,118,698 pounds to 5,300,855 pounds, or 70 percent. Wooden mill-work increased from 11,775,539 pounds to 15,560,169 pounds, or 32.1 percent. Paint and varnishes increased from 9,704,193 pounds to 11,032,774 pounds, or 13.7 percent. The amount of nails increased from 13,336,118 pounds to 24,506,091 pounds, or 83.8 percent.

Shipments of rope and twine decreased by 13.7 percent, from 2,218,601 pounds to 1,914,610 pounds, reflecting the campaign to "Use more cotton" instead of such products as hemp and jute.

Clay and clay products showed an increase of 34 percent, from 13,477,790 pounds to 17,546,996 pounds. Tin, tin plate, and tin cans showed an increase of 24.3 percent, from 35,387,766 pounds to 43,992,805 pounds. Soaps increased by 16.2 percent, from 62,278,520 pounds to 72,338,722 pounds. Explosives increased by 8 percent, from 3,427,378 pounds to 3,702,952 pounds. Ink showed an increase of 16.2 percent, from 1,028,261 pounds to 1,195,024 pounds.

II. ORIGIN OF SHIPMENTS

When the figures for all commodities, except coal, are broken down by States of origin, Maine is seen to head the list in percentage of increase, with 68. Shipments from Maine in year 1 totaled 33,435,542 pounds, and in year 2 they were 56,251,601 pounds.

Next to Maine, the greatest percentage increase is shown by Pennsylvania, with 55.6, the total shipments increasing from 221,999,175 pounds in year 1 to 344,455,923 pounds in year 2.

Other States showing large increases were: New York, 51 percent, from 106,290,623 pounds to 160,542,437 pounds; Ohio, 48.9 percent, from 316,716,439 pounds to 471,633,148 pounds; Michigan, 45.9 percent, from 333,394,010 pounds to 486,309,151 pounds; Wisconsin, 43 percent, from 57,636,584 pounds to 82,542,524 pounds; and Massachusetts, 40.9 percent, from 47,622,507 pounds to 67,088,380 pounds.

Indiana shipped a total of 295,207,974 pounds in year 1 and 413,796,064 pounds in year 2, with an increase of 40.1 percent. New Jersey shipments showed an increase of 33 percent, from 53,867,206 pounds in year 1 to 71,655,328 pounds in year 2. Next was Connecticut, with 32.7 percent, from 10,637,630 pounds in year 1 to 14,120,295 pounds in year 2.

Illinois and New Hampshire were tied in percentage of increase, with 25 percent. Illinois shipments were 471,597,096 pounds in year 1 and 589,605,633 pounds in year 2, while New Hampshire shipments were 5,508,702 pounds in year 1 and 6,898,365 pounds in year 2. Vermont enjoyed an increase of 21.7 percent, from 4,055,517 pounds in year 1 to 4,939,451 pounds in year 2. Delaware was not far behind, with 4,308,104 pounds in year 1 and 5,218,231 pounds in year 2.

Maryland showed an increase of only 2.8 percent, shipping 131,122,250 pounds in year 1 and 134,790,613 pounds in year 2. Rhode Island, with a decrease of 1.3 percent, was the only State to ship less of its products in year 2 than in year 1. The Rhode Island total for year 1 was 11,185,842 pounds, as compared with 11,040,295 pounds in year 2. The explanation for the decrease, as shown by statistics

compiled in the survey, lies in the fact that heavy shipments of textile machinery were made in the spring of 1933.

Figures for the various States of origin are given in table 52.

TABLE 52.—*Industrial commodity shipments to Southeast by States of origin*¹

State	Year 1 (July 1932-June 1933)	Year 2 (July 1933-June 1934)	Percent- age of in- crease
Connecticut.....	10,637,630	14,120,295	32.7
Delaware.....	4,308,104	5,218,231	21.0
Illinois.....	471,597,096	589,605,633	25.0
Indiana.....	295,207,974	413,796,064	40.1
Maine.....	33,435,542	56,251,601	68.0
Massachusetts.....	47,622,507	67,088,380	40.9
Maryland.....	131,122,250	134,790,613	2.8
Michigan.....	333,394,010	486,309,151	45.9
New Hampshire.....	5,508,702	6,898,365	25.0
New York.....	106,290,623	160,542,437	51.0
New Jersey.....	53,867,206	71,655,328	33.0
Ohio.....	316,716,439	471,633,148	48.9
Pennsylvania.....	221,999,175	344,455,923	55.2
Rhode Island.....	11,185,842	11,040,295	-1.3
Vermont.....	4,055,517	4,939,451	21.8
Wisconsin.....	57,636,584	82,542,524	43.2
Grand total.....	2,104,585,201	2,920,887,439	38.8

¹ Not including coal.

For individual cities, the survey reveals great variations as between commodities. Much of this is undoubtedly due to the fact that an individual business often finds its markets shifting from year to year. One market may be lost to a competitor, but another may be gained elsewhere.

CLEVELAND SHIPS WIDE VARIETY OF PRODUCTS

Cleveland, Ohio, is a typical case of a city with diversified production which was substantially benefited by the increased purchasing power of the southeast. Shipments from Cleveland increased from 35,086,765 pounds in year 1 to 64,569,186 pounds in year 2, or an increase of 84 percent.

Of 88 different products shipped from Cleveland, 58 showed increases. Several of the most important were: Automobiles and automobile parts, 168.1 percent increase, from 7,215,579 pounds to 19,341,799 pounds; asphalt, 23.4 percent, from 10,947,211 pounds to 13,505,194 pounds; batteries, 69 percent, from 3,771,325 pounds to 6,373,413 pounds; steel and iron, 188 percent, from 3,465,414 pounds to 9,981,235 pounds; and stoves and stove parts, 69.2 percent, from 1,176,383 pounds to 1,990,057 pounds.

Other Cleveland products showing increases were: Agricultural implements, ammunition, bedding, beer, boilers and parts, bricks, cereals, chains, chairs, charcoal, clay and clay products, confectionery, contractors' equipment, cooperage, copper and products, enamelware, engines, felt and felt products, furniture, metal furniture, glass and glass products, heaters, hides, lithopone, livestock, lumber, machine parts, machinery, farm machinery, cooling machinery, road machinery, nails, paints, paper and paper products, petroleum and petroleum products, plaster, platforms, sand, sauces, woolen shoddy, store displays, table tops, tar and tar products, toluol, tools and equipment,

toys, tractors and tractor parts, trucks, vacuum cleaners, vegetable oils, vehicles, and wool and woolens.

Decreases, on the other hand, were shown for the following Cleveland products: Acids, aluminum and aluminum products, asbestos, brass goods, brooders, miscellaneous building material, burlap, cement, chemicals, cloth, cotton piece goods, cranes, electric lamps, incubators, lime, lead and lead products, liquor, electrical machinery, metal laths, power pumps, rayon, refrigerators, shingles, soap, stone, tallow, tin and tin products, wire, and yarn.

BOSTON SHIPPING TO SOUTHEAST INCREASED 72 PERCENT

Another city with diversified products shipped into the southeast is Boston. For year 1, shipments from Boston totaled 1,987,376 pounds and for year 2, the total was 3,433,155 pounds, making an increase of 72.7 percent. Of 36 products, all but 9 showed increases. Those which increased in year 2, were acids, ammunition, asphalt, boiler tubes, burlap, cereals, chemicals, clay products, confectionery, cooperage, cotton factory supplies, furniture, glass, household goods, leather products, livestock, machinery, mineral wool, paints, petroleum products, roofing, shoe polish, soaps, steel and iron, sweepings, and woolens. Those which decreased were cloth, cotton piece goods, fabric dryer, hides, lumber, paper and paper products, plumbers' ware, shingles, and trucks.

Detroit enjoyed a large increase in business in the southeast, both in percentage and actual poundage. Shipments were 239,053,065 pounds in year 2, as compared with only 156,434,135 pounds in year 1. This represented an increase of 52.8 percent. Automobiles increased by 138.4 percent, from 17,360,506 pounds to 41,383,254 pounds, and automobile parts, by 49.2 percent, from 117,249,721 pounds to 174,983,855 pounds. Refrigerators increased from 842,273 pounds to 2,149,639 pounds, or 155.2 percent, and cooling machinery from 456,701 pounds to 1,768,479 pounds, or 287.2 percent. Steel and iron products increased by 86.6 percent, from 2,072,778 pounds to 3,868,617 pounds. Stoves increased 80.7 percent, from 200,650 pounds to 362,666 pounds. Drugs and chemicals increased from 4,386,601 pounds to 5,559,008 pounds, or 26.7 percent. Altogether, 63 different products were shipped in carload lots from Detroit to the Southeast.

MIDDLE-SIZED CITIES SHOW GAINS

Of the middle-sized cities, the experience of Providence, R. I., is typical. Shipments increased by 81.1 percent, from 704,149 pounds the first year to 1,275,278 pounds the second year. The biggest increase was in lumber. Increases were shown also in asphalt, cables, cooperage, copper products, cotton piece goods, cotton sweepings, cotton thread, leather products, electrical machinery, paper and paper products, soap, steel and iron, tallow and wire. Only cotton softener, machinery and machine parts, and magazines and books showed decreases.

New Haven, Conn., showed a 11.4 percent increase, from 2,666,077 pounds to 2,969,518 pounds. Boxboard, lumber, steel and iron, and wire rope were the important items of increase.

Especially diversified were the shipments from Peoria, Ill., which increased by 66.7 percent, from 18,219,645 pounds to 30,367,267 pounds. Wire and wire fence increased from 5,869,579 pounds to

9,709,489 pounds, or 65.4 percent. Tractors and tractor parts increased by 54.4 percent, from 3,604,041 pounds to 5,562,906 pounds; tin and tin products, by 436.8 percent, from 92,400 pounds to 496,010 pounds; steel and iron, by 46.6 percent, from 1,264,983 pounds to 1,855,039 pounds; nails, by 234 percent, from 1,318,103 pounds to 4,402,248 pounds; agricultural implements, by 115.8 percent, from 188,427 pounds to 406,372 pounds; and paper and paper products, by 37.5 percent, from 616,100 pounds to 846,996 pounds. Forty-five products in all were shipped in carload lots from Peoria to the Southeast.

FARM IMPLEMENTS AND MACHINERY SENT FROM SYRACUSE

Syracuse, N. Y., enjoyed a 34.3 percent increase, from 3,591,480 pounds to 4,822,956 pounds. Drugs and chemicals were the big items, increasing by 22 percent, from 3,179,316 pounds to 3,864,825 pounds. Agricultural implements increased 17.5 percent, from 76,337 pounds to 89,702 pounds. Commercial and farm machinery increased from 50,070 pounds to 574,805 pounds, or more than 1,000 percent.

Sheboygan, Wis., shipped 95.8 percent more industrial products in year 2 than in year 1, increasing from 1,604,550 pounds to 3,142,500 pounds. The big increase was in beverages.

Akron, Ohio, with East Akron included, had an increase of 107.2 percent, from 11,319,489 pounds to 23,454,425 pounds. Tires were a principal factor in bringing about an increase of 111.4 percent, from 8,083,134 pounds to 17,255,352 pounds, in automobile parts; while shipments classified as rubber and rubber products increased by 202.2 percent, from 708,079 pounds to 2,139,686 pounds.

Many smaller cities and towns felt the effects of the flow of cash from the Southeast to the industrial regions. Manville, N. J., for example, experienced an increase of 53 percent, with roofing the big item. Canton, Md., had an increase of 121.4 percent, in which asphalt, drugs, and chemicals played the principal roles. Marion, Ind., shipped 82.4 percent more industrial goods in year 2 than in year 1, bottles and paper and paper products being the outstanding products.

III. FACTORS AFFECTING VOLUME OF SHIPPING

In sizing up the shipments of commodities from individual cities, it would be a mistake to draw too definite conclusions from the figures disclosed by the survey. An apparent sharp increase or decrease in shipments of a given commodity from a given city may be due to any one or more of several factors. First, shipments may have been largely less-than-car-lot one year and largely in car lots in the other. This would distort the totals for a given commodity and city as shown by car lots, although for the general picture these variations would average themselves out.

Second, commodities shipped are not always given the same description in the railroad waybills. While attempt has been made to group the figures in such a way as to make allowance for such variations, these cannot be entirely eliminated in the figures for a given commodity and city.

Third, shipments from a given city may be routed principally over one railroad one year and over some other road the next, or perhaps shipped by truck instead.

Fourth, the channel of distribution may be radically changed, so that the goods are listed with one point of origin in one year and different point of origin the next.

Fifth, competition is continually operating in the business field. Markets may be lost by one manufacturer or jobber, only to be acquired by another. This causes considerable variation in the figures for individual cities and commodities.

OTHER RECOVERY FACTORS

Also, one is not justified in attributing all of the increase in shipments of industrial commodities to the agricultural adjustment program. In the farm field alone, the operations of the Farm Credit Administration have played an important role in releasing buying power which could be used in the purchases of goods. Other parts of the recovery program, including monetary policy, public and civil works, home loans, and increased pay rolls made possible through industrial codes, have all had their effect. So-called "natural" forces of recovery may have entered in.

Which factor has brought about the improvement is not crucial to this discussion. The statistics on intersectional shipments of industrial commodities simply show in a general way what happens when purchasing power is increased in a region in which the dominant industry is agriculture.

IV. OTHER INDEXES OF RECOVERY

The results reported in the survey of freight shipments substantiate in detail the various available indexes of recovery in the agricultural areas of the country. These indexes measure increased consuming power in a variety of ways.

REGISTRATIONS OF NEW PASSENGER AUTOMOBILES AND TRUCKS

Registrations of new passenger automobiles and trucks in the area covered by the Administration's survey are shown in table 53. An examination of these increases in sales from the low point of 1932 in relation to the improvement in farm income reveals the close dependence of the automobile industry and allied activities on the farmers' ability to buy. Farmers curtailed their purchases of automobiles during the years 1930-32 somewhat more than their cash income declined, but with improved income they have increased their purchases in greater measure.

TABLE 53.—Percentage changes in registrations of new passenger automobiles and trucks

	1929	1932=100 percent	1933	1934
	<i>Percent</i>	<i>Percent</i>	<i>Percent</i>	<i>Percent</i>
Virginia.....	279	100	112	160
North Carolina.....	390	100	189	302
South Carolina.....	449	100	214	301
Georgia.....	288	100	176	241
Florida.....	260	100	131	207
Kentucky.....	348	100	145	193
Tennessee.....	445	100	171	255
Alabama.....	650	100	186	336
Mississippi.....	629	100	186	300
West Virginia.....	375	100	150	225
Average.....	373	100	157	238

RURAL RETAIL SALES

Rural retail sales go hand in hand with farm income. This is shown in figure 26. Where the decline in one is paralleled by a comparable decline in the other, the peak in farm receipts for the country as a whole occurs usually in October and the peak in expenditures about 2 months later. Every region shared in the improvement shown in figure 2. The increase in rural retail sales for the first 11 months of 1934 as compared with the like period in 1933 was 22 percent for the United States as a whole; 20½ percent in the East, 24½ percent in the South, 21½ percent in the Middle West, and 24 percent in the Far West. This country-wide improve-

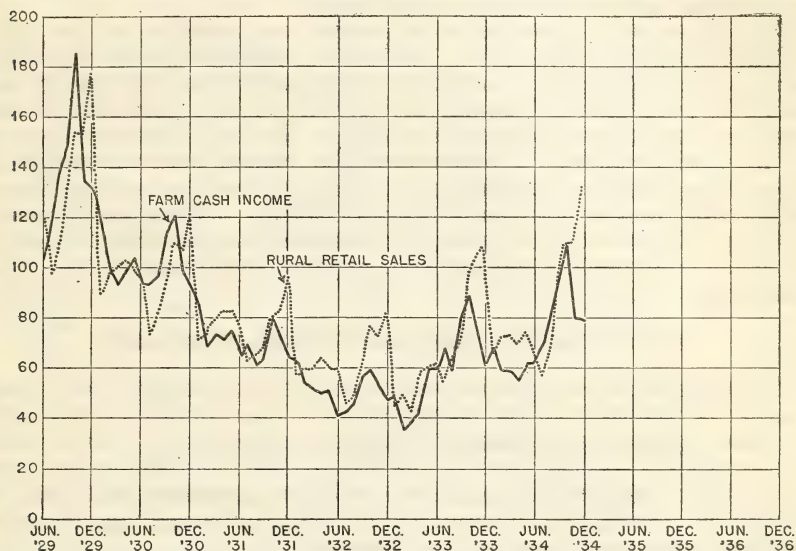


FIGURE 26.—Indexes of farm cash income and rural retail sales, June 1929 to December 1934, inclusive; not adjusted for seasonal variation. (1929-31=100).

ment at the end of 1934 is in the following figures of rural retail sales by regions for December 1934 and December 1933.

	Percentage change December 1934 from December 1933
Total United States.....	+21½ ¹
East.....	+24
South.....	+23½
Middle West.....	+24
Far West.....	+13

DEPARTMENT-STORE SALES

The statistics of the Federal Reserve Board on department-store sales parallel the report of the mail-order houses. The agricultural areas where income increased more than in other areas showed the greater improvement in business. For the United States as a whole, the change in 1934 as compared to 1933 was an increase of 11 percent; for the Richmond district it was 17 percent; for the Atlanta district 18 percent; for the Dallas district 22 percent.

¹ Percentage changes are computed from revised estimates.

LIFE-INSURANCE SALES

The rise in life-insurance sales is a further corroboration of agricultural revival. For the United States as a whole, sales increased 6 percent in 1934 as compared with 1933; in the Southern district of the country they increased 10 percent.

SUBSTANTIATION OF PREMISE ON WHICH ACT IS BASED

All of the data cited in this chapter appear to substantiate the premise on which the Agricultural Adjustment Act was based—that “increasing agricultural purchasing power” would help to “relieve the existing national economic emergency.”

The increased shipments of industrial commodities to the agricultural southeast from the industrial northeast, and the other indexes showing that the increased purchasing power of farmers has been felt in increased business activity throughout the Nation, are direct evidence that the new farm dollars do find their way back to the industrial centers. Furthermore, the farmers near the industrial centers are benefited indirectly. Many of these farmers sell their milk, fruits, and vegetables in nearby markets. When employment and pay rolls are at a low level, these farmers are adversely affected; but when employment and pay rolls expand, they share in the urban prosperity.

AN INCREASE IN THE PRODUCTION OF WEALTH

The facts show that the increased income of farmers is not a mere transfer of wealth from the city dwellers. This could be true only if the money placed in the hands of farmers failed to find its way back to the cities. As the facts demonstrate, the increased prices paid by the city dwellers for their food and fiber products are offset, at least in large part, by the factory production and employment resulting from the money spent by the farmers.

Previous to the launching of the general recovery program by the Government in 1933, business activity in the United States had been declining for nearly 4 years. Farmers could buy less and less from city dwellers, and the city dwellers had less and less money with which to buy from the farmers. The recovery program represents an attempt to reverse this process. By placing new purchasing power in the hands of farmers, the Government seeks to help turn the wheels of industry. At the same time, by placing new purchasing power in the hands of industrial workers, the Government seeks to increase the returns received by farmers for their products.

Farmers and city dwellers are interdependent. When one group is prostrate, the other also suffers; when one group is prosperous, the other shares in the gain.

The real loss caused by the depression has been measured by the low level of business activity. Anything which increases business activity actually increases the production of wealth. That the agricultural adjustment program has made an important contribution toward increasing business activity, and thus the production of wealth, is amply demonstrated by the facts.

CHAPTER 20

MEETING THE NATION'S CHANGING NEEDS

SALIENT FACTS ABOUT LONG-TIME ADJUSTMENT

1. Present actual crop acreage.....	million acres..	360 to 365
2. Acreage needed for present indicated domestic and foreign requirements.....	million acres..	335 to 345
3. Indicated excess acreage of average productivity above present requirements.....	million acres..	15 to 30
4. Percentage of decline in agricultural production from 1929 to 1934.....	percent..	15
5. Percentage of decline in industrial production from 1929 to 1934.....	percent..	42
6. Percentage of decline in agricultural prices from 1929 to 1934.....	percent..	39
7. Percentage of decline in industrial prices from 1929 to 1934.....	do.....	14
8. Estimated percentage of national income received by farmers in 1932.....	percent..	7.5
9. Estimated percentage of national income received by farmers in 1934.....	percent..	10.2

I. A LONG-TIME VIEW OF THE PROBLEM

As the pressure of emergency has lessened, the problems of agricultural adjustment have changed. There is opportunity now to replace temporary measures appropriate only to extraordinary conditions, with an agricultural policy looking toward long-view objectives.

Restricted production will not be the focal point of a permanent policy for agriculture. Lasting improvement in the welfare of farmers is necessarily bound up with increased production and consumption of agricultural products. A long-view policy for agriculture, therefore, cannot passively accept the present limited purchasing power for food and fiber products of large numbers of our people, nor conceive future production on that basis. Rather it must contemplate a more abundant economy for all groups.

A long-view policy for agriculture will actively seek to remove barriers that now constrict international trade.

It will aim to put its own lands in better order, and tie in the various adjustment programs with long-time objectives of efficient land use. Taking account of past mistakes—misguided settlement, too-intensive cultivation, soil erosion and depletion, overproduction, overgrazing, and abuse of the public domain—a corrective program through a broad policy of land use based on national welfare is indicated.

EXCESSIVE SUPPLIES REDUCED

When the Agricultural Adjustment Act was passed in May 1933, excessively large stocks of the major crops were on hand, and livestock numbers were high and increasing.

The pressing problem then was the problem of surpluses. But by the end of the 1933-34 crop year, the various adjustment programs and the extreme drought had reduced these excess stocks to a level near normal for wheat, feed grains, and some other commodities in which surpluses had existed. Supplies of some commodities most seriously affected by drought were below normal.

Stocks on hand at the end of the 1934-35 crop year can be estimated only approximately, but it is probable that wheat stocks will be down to about normal and cotton stocks reduced but still well above normal, whereas supplies of corn will be only one-third to one-half what they were at the beginning of the year. Hog numbers will have reached a level lower than for any year in the last decade; and beef cattle will perhaps be at about the 1927-29 level.

How much can continued adjustment serve to increase further the incomes of farmers, and how much will depend upon general economic recovery? How far may rehabilitation and subsistence types of farming supplant relief for stranded families? To what extent can a program of submarginal land retirement serve as an adjustment measure? How may future adjustment programs distribute production more equitably among regions, encourage better land utilization, and allow a maximum freedom of action for individual farmers?

These are some questions that face farmers and agricultural planning agencies as they consider the future of the farm program.

PLANNING PRODUCTION

The Nation's need for agricultural products is the basis for the formation of a policy of land use. Agriculture should supply enough products to satisfy the requirements of domestic consumption and to meet the demand of an export market. The policy should avoid excessive wastes incident to overproduction.

The volume of agricultural production normally required for domestic consumption and for exports may be measured by recorded consumption and exports of the recent past. To this appraisal should be added careful consideration of changes that may occur within the next few years.

The per capita consumption of foodstuffs measured in weights sold in the retail market in the United States averaged about 1,422 pounds for the period 1920-24, about 1,474 pounds for the period 1925-29, and about 1,454 pounds for the period 1930-33 (table 54).

TABLE 54.—Average per capita consumption of principal agricultural products, 1920-33 ¹

Commodity or group	Pounds per capita per year in periods—			
	1920-24	1925-29	1930-33	1920-33
Cereal products.....	228	229	221	226
All potatoes.....	172	162	154	163
Sugar and sirup.....	110	116	109	112
Dairy products:				
Milk and cream ²	315	335	349	332
Manufactured.....	43	47	45	45
Fruits:				
Fresh ³	173	186	176	179
Dried.....	6	6	6	6
Vegetables ⁴	142	157	158	152
Lean meats and fish.....	135	132	130	133
Eggs.....	23	26	27	25
Beans, peas, nuts.....	14	15	16	15
Fats (except butter).....	45	46	45	45
Total food ⁵	1,422	1,474	1,454	1,450
Wool.....	5	5	4	5
Cotton.....	24	26	20	23
Tobacco ⁶	8	9	8	8
Flaxseed.....	16	20	12	16

¹ Consumption of foodstuffs in terms of weight sold in retail market.² Whole milk and cream in terms of whole milk.³ Fresh and canned fruit in terms of fresh fruit, watermelons, and cantaloupes included.⁴ Consumption of fresh and canned vegetables per urban inhabitant in terms of fresh vegetables. Data for production of farm gardens not available.⁵ Includes 16 to 18 pounds of coffee, tea, spices, cocoa, and chocolate in addition to the items listed.⁶ Consumption per person 15 years old or over.

An average per capita consumption of food equal to that which prevailed in the years of the most prosperous period of the three noted, 1925-29, could be supplied for our present population of about 126,500,000 people from 285 to 290 million acres of harvested land of average quality. It is doubtful whether this average consumption will be increased in the immediate future.

Average consumption of nonfood products shows greater variation than that of foodstuffs. The average per capita consumption of wool and cotton, for example, declined 20 percent from 1925-29 to 1930-33. About 20 million harvested acres of average crop land would supply our present population with nonfood products at the 1930-33 level. It would take about 25 million acres to supply our population with nonfood products at the 1925-29 level.

II. DOMESTIC AND FOREIGN SITUATION

THE FACTOR OF FOREIGN TRADE

The foreign trade situation will necessarily play a large part in determining agricultural policy at home. The United States has faced the loss of foreign markets ever since the World War, with the greatest loss occurring in the last few years.

If export markets at prices sufficiently remunerative to producers could be regained, these markets would once more provide a margin of safety in disposing of surpluses, and the adjustment of production in the United States might be considerably eased. But if foreign trade remains at the present low level or declines further, need for maintaining adjusted production will continue or increase.

The Agricultural Adjustment Administration is appraising the requirements of export trade as a factor in planning agricultural

production, and it is also cooperating with other branches of the Government in active measures for increasing the foreign outlets for American farm products.

Expansion of agricultural exports would be of net advantage to farmers and to the Nation as a whole only in case the returns for such exports are large enough. Exports at excessively low prices would contribute little to farmers' returns and the small gains might be offset by depletion of the soil.

DUAL PRICE POLICY

There has been suggested a "dual price policy" of offering exports at prices lower than those prevailing for the same commodities in the domestic market, with the purpose of maintaining the competitive position of the United States in foreign markets.

Unless coupled with production control under the Agricultural Adjustment Act such a policy might invite a sequence of expansions in supplies requiring greater and greater subsidies, increasingly costly and ultimately self-defeating. Furthermore such a policy might encounter antidumping or other countervailing action on the part of other countries which would deny foreign outlets for many of its export commodities.

In any case, if the United States is to increase its exports it must become a better customer of foreign countries. If we wish to sell abroad we must buy from abroad. Exports and imports must expand together if they are to expand at all.

Concerted efforts are being made to regain the foreign market, reciprocal trade treaties have been concluded or are being negotiated with Cuba, Brazil, Belgium, and half a dozen South American and Central American countries. In addition, a first and a second import-export bank have been organized and the export movement of wheat from the Pacific Northwest was supported in 1933-34 by the Agricultural Adjustment Administration through the North Pacific Emergency Export Association. But foreign trade is so hampered by tariffs, quotas, embargoes, quarantines, subsidies, and exchange restrictions, that a gradual increase in the exports of agricultural products of the United States is all that can be expected.

FOREIGN TRADE AND PRODUCTION PLANNING

For any period immediately ahead, agricultural production in the United States should be planned in the light of domestic needs and reasonable prospects of exports. It is not the intention of the Agricultural Adjustment Administration to effect production programs that restrict the possibility of increased foreign trade, but to keep such programs flexible so that it will be possible to respond promptly and fully to any increase in demand either at home or abroad.

So far as imports are concerned the United States is not in position to replace, economically, any great volume of present agricultural imports by domestic production, while there is a prospect of reviving export trade. Appraisal of acreage required, therefore, is based on the assumption that this country will continue to import considerable quantities of such products as sugar, flaxseed, coffee, bananas, and rubber.

United States foreign trade in agricultural products has shown a marked decline in the last decade. This decline has been at a greater rate since 1930, as table 55 indicates.

TABLE 55.—*Index of volume of agricultural exports, and value of agricultural exports, by fiscal years and by July–November averages*

	Quantity of agricultural exports ¹ (1909–10 to 1913–14 = 100)	Value of agricultural exports in \$1,000 ²
Year ending June 30:		
1930–31.....	90	1,038,034
1931–32.....	98	752,145
1932–33.....	85	589,653
1933–34.....	83	³ 787,259
July–November:		
1933.....	95	⁴ 344,324
1934.....	62	⁴ 314,020

¹ 44 farm products, not including forestry products.

² All agricultural exports, not including forestry products.

³ Preliminary.

⁴ Principal agricultural products only.

TABLE 56.—*Exports of principal agricultural commodities and acreage equivalent, 1919–20 to 1933–34*

Year	Exports, year beginning July 1							Acreage equivalent of exports ⁵
	Wheat, including flour	Grains other than wheat ¹	Cotton lint ²	Tobacco, unmanufactured	Pork, excluding lard ³	Lard, pure	Beef ⁴	
	1,000,000 bushels	1,000 tons	1,000 bales	1,000,000 pounds	1,000,000 pounds	1,000,000 pounds	1,000,000 pounds	1,000 acres
Average 1910–14.....	107	1,746	8,840	392	439	474	222	-----
1919–20.....	222	3,369	7,035	648	1,175	587	368	69,891
1920–21.....	369	4,481	5,570	507	776	746	204	83,839
1921–22.....	283	7,290	6,592	463	704	812	222	77,663
1922–23.....	225	5,350	5,205	454	842	953	195	66,645
1923–24.....	160	2,028	5,784	598	919	1,015	185	55,228
1924–25.....	261	2,935	8,239	431	607	793	190	73,137
1925–26.....	108	2,696	8,110	537	477	695	152	55,815
1926–27.....	219	2,180	11,281	516	337	676	152	75,049
1927–28.....	206	2,674	7,890	490	330	716	107	64,325
1928–29.....	164	3,433	8,520	566	331	781	101	65,633
1929–30.....	153	1,249	7,096	600	351	787	102	51,163
1930–31.....	131	546	7,048	591	206	586	98	46,805
1931–32.....	136	417	8,989	432	137	543	79	53,658
1932–33.....	41	651	8,647	400	126	560	74	43,733
1933–34 ⁶	37	394	8,366	473	159	547	79	38,805
Average 1925–29.....	192	2,784	8,808	508	417	732	140	66,792
Average 1933–34.....	39	522	8,506	436	143	554	76	41,269

¹ Barley including flour and malt, rye including flour, oats including meal, corn including meal, year beginning July 1; and exports and shipments of wet process corn products, calendar years following.

² Bales of 500 pounds gross.

³ Canned, fresh, salted, or pickled pork, neutral lard, lard oil, bacon, and hams, Wiltshire and Cumberland sides.

⁴ Canned, cured, and fresh beef, oleo oil, oleo stock, oleomargarine, tallow, and stearin from animal fats.

⁵ Acreage equivalent at average yields of crop year export and shipments to noncontiguous territories, combined with calendar year exports and shipments of livestock products, including an allowance for workstock.

⁶ Preliminary.

Exports of wheat declined from a high of 370 million bushels in the fiscal year 1920–21 to 37 million bushels in 1933–34, and exports in

1934-35 will be even smaller than in 1933-34. Our exports of pork and lard have declined from almost 2 billion pounds in 1923-24 to 700 million pounds in 1933-34, and exports are expected to be even smaller in both 1934-35 and 1935-36. Our exports of cotton and tobacco have been maintained at a more stable level, although exports of tobacco dropped from 600 million pounds in 1929-30 to 400 million pounds in 1932-33. Altogether, the acreage at average yields required to supply our exports declined from 84 million acres in 1920-21 to 39 million acres in 1933-34. (See table 56.)

EXCESS ACREAGE STILL A PROBLEM

If, as this analysis indicates, the acreage needed to supply domestic requirements and exports of agricultural products is not materially increased in the years just ahead, it cannot be expected to exceed 340 to 350 million average acres of harvested crop land. That is, 30 to 40 million acres will be required for exports, and, for domestic consumption, 285 to 290 million acres will be required for food products together with 20 to 25 million acres for nonfood products.

The actual acreage of crop land harvested averaged 360 to 365 million acres for the period 1928 through 1932. *As a result, this country is faced with an excess acreage equivalent to 10 to 25 million harvested acres of crop land, at average yields, provided the land is left idle. A shift of 20 to 40 million acres would be required if intensive crops were replaced by hay and pasture and no land left idle. If the adjustment is effected by retiring submarginal crop land, an acreage equally as large or larger would be required.*

An increasing population and an improvement in the foreign situation are expected to result in a gradual increase in the acreage of crop land required. But a continuing agricultural-adjustment program is needed until the eventual solution is achieved, and it is in such a program that farmers and others are especially interested.

III. RELATION OF AGRICULTURE AND INDUSTRY

The problems of farmers in the immediate future are also related to industrial conditions. Farmers should recognize that, by itself, adjustment of agricultural production can improve the farm income to only a limited degree. There are strong reasons for continuing adjustment, in order to reach and maintain a balance both between agriculture and industry as a whole, and among the several branches of agriculture. But when this balance is attained, further improvement in the income of farmers will depend on increased activity, income, and purchasing power of industrial groups.

Thus, in 1870, when those employed in agriculture constituted 53 percent of the total gainfully employed persons in the country, farmers received 26.5 percent of the national income. In 1900, when 36 percent were employed in agriculture, the farm share of the national income was 20.5 percent; and in 1920, when 26 percent of the population were in agriculture, their share of the national income was about 17 percent.

The rate of increase of farm income did not keep pace with the rate of increase of per capita national income through the decade prior to 1930, however, and the depression reduced the farmers' share still further until estimates indicate that in 1932 farmers received

only 7.5 percent. By 1934 this share had risen to an estimated 9.1 percent without benefit payments and receipts from Government purchases of drought livestock, and 10.2 percent including those pay-

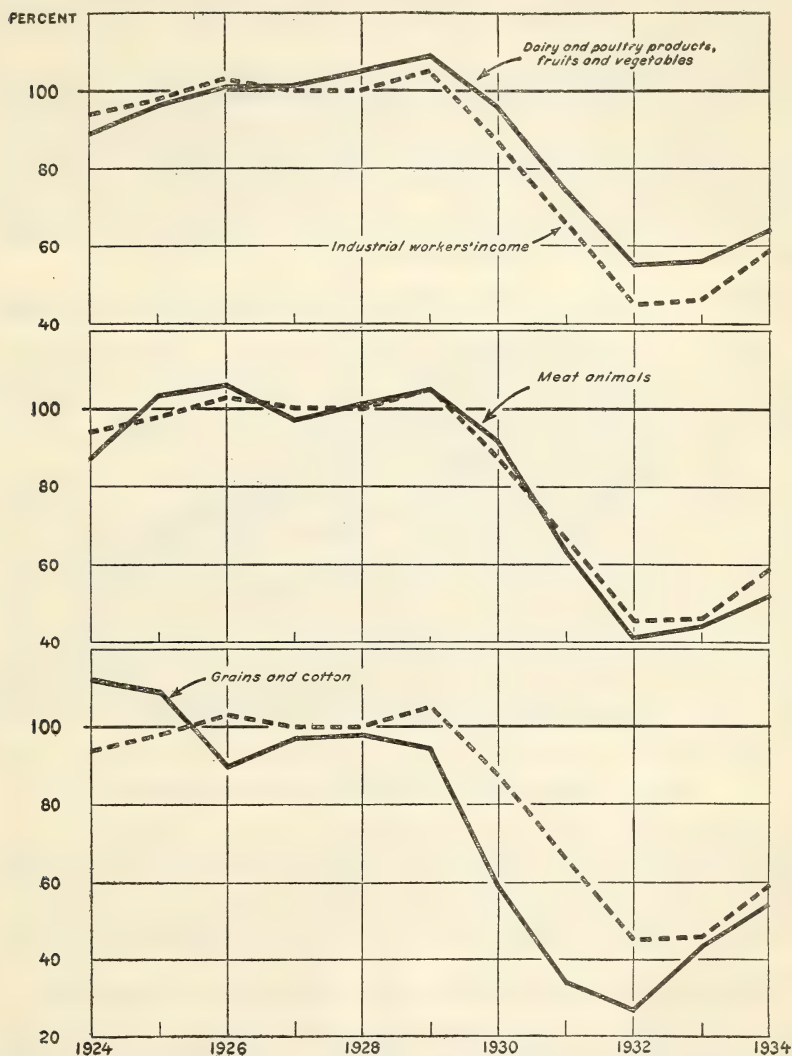


FIGURE 27.—Income of industrial workers and cash income from farm products, 1924-34 (1924-29=100 percent).

ments. If in 1934 the farm population had received the same per capita share of the national income it had received in the 7 decades prior to 1920, the farm share would have been 13 percent. To attain this proportion the farm income in 1934 would have had to be from one-fourth to one-third greater than it really was.

THE IMPORTANCE OF A RAISE IN CONSUMERS' INCOMES

Consumers' incomes to a large extent determine the level of farm income to be derived from products sold in domestic markets. The relationship is less pronounced in the case of income from products in export trade.

This interdependence is illustrated in a comparison of the course of industrial workers' incomes as compared with gross incomes from three groups of farm products from 1924 through 1934 (fig. 27). The course of workers' incomes, in general, paralleled the trend of gross returns to producers of dairy and poultry products, fruits and vegetables, and meat animals. The greater relative decline in the level of returns for grains and cotton, which are export commodities, is due to a decrease in foreign demand.

INDUSTRIAL AND AGRICULTURAL PRICES STILL UNBALANCED

Continued disparity between agricultural and industrial prices is another limiting factor in recovery. In 1932 farm prices were approximately 35 percent below that relation of farm prices to industrial prices which had held for the 20-year period prior to 1930. In 1934 farm prices were still 25 percent below that relation.

An improvement in this relationship would naturally be brought about either by a further advance in agricultural prices or by a lowering of the level of industrial prices. Since the agricultural price level is now being largely supported by shortages due to an unprecedented drought, it is doubtful whether further increases in agricultural prices would be practical at present. Improvement in the exchange value of agricultural for industrial products can be accomplished, then, either through lowering industrial prices and costs or through such a rise in the total national income and in city buying power as would support an increase in farm prices and in the farmers' share of the national income.

INFLEXIBLE COSTS ALSO RETARD RECOVERY

Further limitations on farm purchasing power in relation to farm income are certain costs that are relatively inflexible, as taxes and distribution costs. In 1934 farm taxes were approximately 160 percent of the pre-war level as compared with only 90 percent for farm prices. A similar disparity existed in the case of distribution costs.

UNBALANCED AGRICULTURAL AND INDUSTRIAL PRODUCTION

The problem of balance between the shares of the national income going to agriculture and to other groups is intimately related to the present unbalanced situation not only between agricultural and industrial prices, but between agricultural and industrial production. The volume of output of factories processing agricultural products was only 18 percent lower in 1932 than in 1929, whereas the output of factories that processed industrial raw materials was nearly 60 percent lower than in 1929. How this disparity in volume of production is related to disparity in price can be seen in that farm products lost only 18 percent in volume between 1929 and 1932, but 54 percent in price; while industrial products lost 59 percent in volume, but only 21 percent in price. (See table 57.)

It is clear from these facts that the disparity between agricultural and industrial prices might be largely removed by a material increase in industrial production. Such an expansion, accompanied by substantial reemployment, would increase the domestic purchasing power for farm products and, therefore, raise agricultural prices. A reduction in the level of industrial prices would undoubtedly stimulate increased sales of such products, and bring an increase in industrial production, and it would also have the effect of increasing the relative purchasing power of farm products.

The extent to which industrial production is now out of line with the course of industrial growth since 1899 is indicated in figure 28.

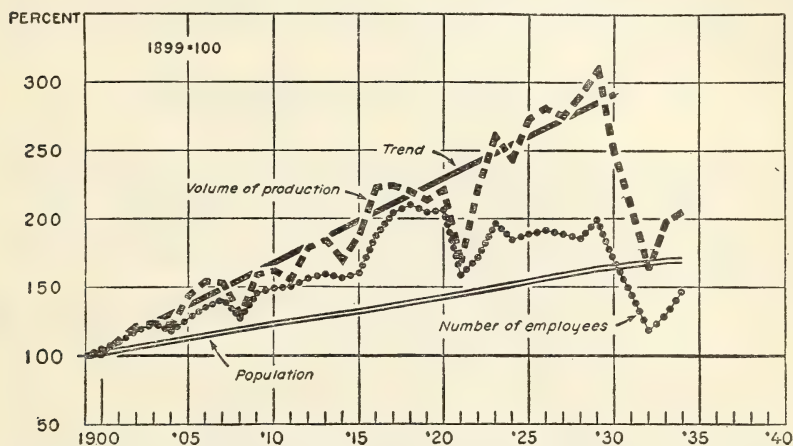


FIGURE 28.—Production of manufactures, factory employment, and population, United States, 1899 to 1934, inclusive.

TABLE 57.—Indexes of agricultural and industrial production and prices, 1927–34 (1929=100)

Year	Production		Prices		Ratio of industrial to agricultural production ⁵	Ratio of agricultural to industrial prices ⁶
	Agricultural ¹	Nonagricultural ²	Agricultural ³	Nonagricultural ⁴		
1927.....	98	84	95	102	86	93
1928.....	95	93	101	101	98	101
1929.....	100	100	100	100	100	100
1930.....	87	77	84	96	89	90
1931.....	88	58	62	83	66	76
1932.....	82	41	46	79	50	58
1933.....	93	52	49	78	57	63
1934.....	85	58	61	86	65	70

¹ Factory production in industries using agricultural raw materials.

² Factory production in industries using nonagricultural raw materials.

³ Wholesale prices of farm products.

⁴ Wholesale prices of all commodities other than farm, food, and textile products.

⁵ Column 2 divided by column 1.

⁶ Column 3 divided by column 4.

In 1929, industrial production was more than three times that of 1900. A continuation of that 30-year rate of growth would call for a volume at present approximately 325 percent of the 1900 level. Actually, our recovery of 1933 and 1934 has placed us only at a level

of about 205 percent of the 1900 level, so that to regain a volume in line with our pre-depression trend, we need an increase in industrial production of around 50 percent above the present level.

The interest of the farmer in means for accelerating industrial recovery is evident. Without active efforts toward business revival, recovery would be delayed for a considerable time, and substantial improvement in the farmer's economic status would also be delayed.

The farmers' situation and prospects are thus intimately bound up with the rate of industrial recovery. Until substantial industrial expansion takes place, there will continue to be a disparity between agricultural prices and industrial prices, and consequently between agricultural and industrial income. And it would seem that industrial expansion depends to a large extent on a better balance between industrial prices, costs, and volume.

IV. PERMANENT LAND ADJUSTMENT

Whatever the trends in industry and foreign trade may be, agriculture will gain from continued efforts to put its own plant in better order. These efforts will include not only the balancing of production with demand, but also a better utilization of the total agricultural plant, particularly through development of a definite, consistent, and unified policy in the use of land.

Considerable progress has been made in the last year both in the development of such a policy and in the initiation of steps to effectuate it. The National Resources Board, created by President Roosevelt last spring, has made the most comprehensive survey in our history of the factors entering into a long-time land policy, and has recommended lines of action to carry out such a policy. A program of purchase and retirement of submarginal lands has been initiated, and a considerable number of demonstration projects looking toward the beneficial public use of retired lands have been started.

At about the turn of the century, our formerly extensive supply of good cheap land had been largely taken up and settlement proceeded to poorer lands. This has brought unfortunate individual and social consequences.

Scattered settlement has resulted in excessive per capita costs for schools, roads, and other local governmental services.

In numerous cases, State and Federal aid has been required, in an attempt to improve almost unimprovable land, for rural relief expenditure, and for loans which cannot be repaid.

Serious erosion and other misuses of land have occurred.

In the far West, an out-worn homestead policy lured many farm families to lands too poor for crop farming, and limited by law to a size too small for successful grazing.

Irrigation projects were sometimes located without due regard to the economic adaptability of the land reclaimed.

Certain areas of the remaining public domain were overstocked and overgrazed, with resultant serious deterioration and destruction of the cover, and serious erosion.

In the Great Plains, large areas were plowed up for wheat during the World War, and the nutritious native grasses destroyed while wind erosion is rapidly removing top soil in some areas. It is now clear that some of these lands cannot be profitably farmed under normal prices and costs.

Perhaps the most serious consequence of misguided settlement, however, has been the tragic waste of human resources. Provision for resettlement on better land should be made for families now bankrupted by poor land, and much of the land too poor for agriculture should be devoted to public forests, wildlife and game refuges, parks, and recreational areas.

THE LONG-TIME LAND PROGRAM AND AGRICULTURAL ADJUSTMENT

Such a long-time land program is interrelated with the problems of continuing agricultural adjustment. The gradual retirement of submarginal lands may eventually shrink our agricultural plant to a size more in keeping with the needs of agricultural production, particularly if, in the meantime, demand increases through a revival of foreign trade and through a rise in population at home. In this case, adjustment of production on commercial farm land would be relatively easier than at present.

Meanwhile, continuing adjustment of production on average and good land should itself be coordinated with a national policy of land use. Since the bulk of our agricultural wealth consists of commercially productive land, land policy must be conceived broadly in terms of both submarginal, and good and average land. Therefore, adjustment methods should encourage soil-improving and erosion-preventing practices on highly cultivated lands.

REPORT OF THE NATIONAL RESOURCES BOARD

The report of the National Resources Board, previously alluded to, gives a basis for the conclusion that it will be practical for some years at least to farm our commercial lands according to relatively extensive methods; that is, to continue the practice already initiated through the adjustment program, of keeping a certain percentage of crop acreage in grass, forage, and other extensive crops. This report estimates that our arable land requirements, in terms of harvested acreage, will probably not exceed 353 million acres before 1940. This is some 10 million acres less than our actual crop acreage at the present time.

The land section of the report was the cooperative work of a great many Federal and State agencies under the leadership of the Agricultural Adjustment Administration. It consists of two sections, the first a comprehensive summary of the principal findings, with recommendations for action; the second a detailed survey of the problems demanding solution, with maps locating the chief problem areas, and a discussion of policy at greater length. The principal topics covered by the land section of the report include:

Conditions and tendencies influencing major land requirements, including the outlook for population, the industrial outlook, and the relation of mechanical progress in agriculture to land use and policy.

Land requirements in relation to land resources.

Requirements for agricultural, range, forest, recreational, and wildlife land, and resources available to supply these requirements.

Maladjustments in land use and proposed measures of correction, such as erosion control, retirement of poor farm land, and revised policy of settlement.

Survey of problems and development of policies with regard to forest lands, national recreation, wildlife, and Indian lands.

Programs for public land acquisition and for chronically tax-delinquent land.

Proposals with respect to organization and procedure in the development of a unified land program.

Other activities of the Agricultural Adjustment Administration in developing a land program have involved the classification of poor lands with respect to possible public uses; study of rural zoning by States and other methods for bringing land into better use; examination of land settlement in foreign countries for the light it may throw on American policy; investigation of local government and finance structures with respect to land problems; and the coordination of land policies with the adjustment program of the Agricultural Adjustment Administration.

SETTLEMENT OF NEW LANDS BALANCED BY RETIREMENT OF OLD

The necessity of not increasing the agricultural plant of the United States for the time being has governed the Administration policy of land settlement during the present period. There are human and economic reasons for the progressive retirement of land too poor for farming; there are also human and economic reasons for the opening up of certain areas of good land by drainage or irrigation which may allow profitable farming for rural families.

Allocation of funds for these respective purposes, however, has been based on the definite principle that as fast as good new lands are brought into cultivation, corresponding productive units of submarginal land will be taken out of cultivation.

The program of retirement of submarginal land has already made considerable progress. An allotment of 25 million dollars from the Public Works Administration, supplemented by funds from the drought relief appropriation of Congress, will enable the purchase and retirement of several millions of acres of poor land. The Federal Emergency Relief Administration, to which these funds have been allocated, is directing the land-purchase program, with the Agricultural Adjustment Administration cooperating as a technical planning agency.

RETIRED LAND WILL BE PUT TO PUBLIC USE

The application of the term "submarginal" to land is somewhat ambiguous, since land too poor for farming often has high value for other purposes, such as forest reserves, grazing lands, wildlife refuges, public parks, and recreation areas. These social uses of our open lands are of particular importance in view of the great development of hard-surfaced roads throughout the country in recent years and the increasing touring habit of the American people.

Insofar as the submarginal lands purchased and retired from cultivation will continue to have an agricultural significance, the land policy section of the Agricultural Adjustment Administration, through its nine regional directors, is serving the Relief Administration as a planning agency in selecting and developing a certain number of agricultural demonstration projects. In December 1934 there were in various stages of development 65 agricultural demonstration projects of this sort in 44 states.

Approximately 6 million acres of land are included in these projects, and present plans call for the purchase of about 1 million more acres

for the same purpose by the close of the fiscal year. This program as a whole will involve a total of some 10 million acres.

Other agencies are developing other types of projects. The National Park Service is planning park and recreational projects, and the Bureau of Indian Affairs is developing projects concerned with Indian lands. The Bureau of Biological Survey is planning certain types of migratory waterfowl projects.

RURAL REHABILITATION AND THE FARM PROGRAM

The prospect of retiring from cultivation many millions of acres of unprofitable farm land can be contemplated only in relation to the problem of livelihood for the thousands of farm families who have been living on this land. This problem is complicated further by the numbers of families now seeking support on the land who would normally have gained a livelihood in industry. At the close of 1934 there were on relief about 900,000 farm families, 300,000 of which were drought-relief cases.

The impingement of industrial depression and unemployment upon the problem of livelihood on the land may be further noted in the increased supply of farm labor during the last few years. In the spring of 1933, when factory employment was 40 percent lower than in 1929, the supply of farm labor in relation to demand for it was about twice as great as in 1929. The partial recovery in industry in 1934, supplemented by the various public-works programs, has brought about some reduction in the number of people seeking opportunities in farming, but so long as city unemployment persists, there will continue to be a large number of city people seeking livelihood on the land, thus complicating the problem of rural rehabilitation.

To assist these different groups of people—families impoverished by trying to farm submarginal land; families returning to the land when industrial opportunities diminished and others forced to stay on farms for the same reason; families stranded through the drying up of rural industries which gave them part-time employment—is part of the problem facing the Agricultural Adjustment Administration, which is serving relief agencies by helping to formulate plans and methods for rural rehabilitation work and coordinating them with its own activities.

V. IMMEDIATE AND TRANSITIONAL PROBLEMS

While the rehabilitation and land-use programs are endeavoring to conserve both human values and natural resources on the land, the current adjustment programs are being adapted toward the same objective, better use of commercial farm lands and a maximum degree of freedom to farmers participating.

Adjustment programs can influence better use of good farm land, particularly on the significant areas of such land that have been withheld, through these programs, from major crop production. An estimated total of nearly 36 million acres, an area larger than the State of Ohio, was designated as contracted or rented acreage under the 1934 adjustment contracts.

REPLACEMENT CROPS

Since this acreage could be utilized in various soil-improving ways, the program represents a valuable approach to land conservation as well as to production adjustment. In 1934 the Agricultural Adjustment Administration investigated the various uses being made of this acreage, and found that many millions of acres were put in food and feed crops for home use, and probably an equal acreage was held fallow or idle. Soil-improving and erosion-preventing crops and new pasture and meadow crops were planted on many of the contracted acres. Some acreage was planted in woodlots.

This disposition of land which would otherwise have been continued in intensive and soil-depleting crops such as cotton, wheat, corn, and tobacco, should pay future dividends in conserved soil resources.

BASE-PERIOD METHOD MAY BE MODIFIED

The base-period method of determining production quotas has been used so far because of its ease of application. But both with respect to a more equitable distribution of quotas among farmers, including new producers who may want to come into the program, and with respect to the best practices of farm management, the base-period method falls short of the ideal.

It has already been liberalized in the case of the tobacco contracts, under which each producer has an opportunity to choose his base from a number of alternative combinations of years in the base period, and adjustments may be made in the base production under individual contracts when the relationship between the base acreage and the base production is found to be abnormal.

The base period method has also been liberalized for the 1935 corn-hog program, under which farmers who have had an abnormally low average corn acreage during the base period because of unusual circumstances may enter the program, increase their corn bases to a point in keeping with the relationship between corn acreage and total acreage for the local township, and receive benefit payments on hogs.

It has been suggested that the various commodity programs be replaced in diversified farming regions by a single contract through which farmers would contract to withhold a certain percentage of their cultivated land from major crop production, but might plant the remaining acreage to any crop or crops they desired. Such a program would liberalize the base-period provision and allow a maximum of freedom of action for the individual farmer. However, it is doubtful whether such a plan would result in the desired degree of balance in production of the various crops, or make certain that good farm-management practices would be adhered to.

A variation of this plan might provide for a proper balance in the production of different crops, and still allow and even encourage good farming practices. Under this variation, related commodities such as wheat, rye, and flax on the one hand and corn, barley, and grain sorghum on the other might be grouped together, and acreage bases established for each group. Contracting farmers would be free to distribute the allotted acreages among the several crops as they saw fit.

Still another suggestion is that the allotted acreages be determined upon the basic systems of farming appropriate to various regions and localities. Under this plan, each contracting farmer would agree to adopt an approved rotation, determined by a local committee in cooperation with a State committee, which would limit the percentage of the cultivated or tillable land that could be planted to intensive crops such as corn, cotton, and wheat, and would require that a certain percentage of the land be devoted to soil-improving crops such as hay and legumes, or be put in pasture, or fallowed.

ADJUSTMENT OF LIVESTOCK NUMBERS THROUGH A FEED-GRAIN PROGRAM

The general adjustment program would be still further simplified if desired adjustments in livestock production could be achieved through the control of feed-grain production. Such information as is available indicates that livestock numbers may be controlled to a considerable degree in this manner.

The situation in 1934 with regard to livestock made such a plan particularly feasible. When livestock production was at a peak, as was the case in 1932 and 1933, a downward adjustment in feed-grain production without a coordinated livestock program would have tended to squeeze livestock producers and force liquidation. In 1934, however, the situation changed. The numbers of every class of livestock were reduced to, or below, a desirable level, and a careful feed-grain adjustment program could very probably obtain a sufficient degree of control over future livestock production without specific livestock programs.

AIMS OF FUTURE ADJUSTMENT PROGRAMS

These suggested modifications of adjustment methods enter new ground, from the standpoint of present programs, and not all their attendant financial and administrative problems have been solved. In relating production adjustment to a long-time land program, there is need for transitional programs which meet certain changed requirements.

In the first place, any continuing agricultural adjustment program will be more concerned with balancing acreage and production as among crops and classes of crops than with reduction as such, since reduction has largely been effected already.

Second, new programs should be concerned more definitely with the prevention of soil erosion and depletion.

Finally, new programs should aim at an equitable and efficient distribution of production among the various agricultural regions and among individual farms.

There is an excess of 15 to 30 million acres of crop land of average quality. A sound land program can reduce part of this acreage by transferring submarginal farm land to public uses not involving agricultural production. For the most part, however, the effect of this excess acreage should be offset by such plantings in the more important farming regions as will halt erosion and soil depletion and will guarantee a more liberal supply of hay and forage.

To this end the 1935 wheat program was modified to permit more hay and forage crops and new seedings of pastures and legumes; the

1935 corn-hog program emphasized pasture and meadow as replacements for the contracted corn acreage; and the cotton and tobacco programs for 1935 provided, as in 1934, for optional use of contracted acres for home food and feed crops, and for erosion-preventing and soil-improving crops, and farm wood-lots.

Although it might be argued that an increased acreage of hay and pasturage would encourage increased production of dairy products and beef cattle, a given acreage of such crops does not produce as much feed as an equivalent acreage of grain. Moreover, hay and pasture production can be increased only gradually in the years immediately ahead, because of the deterioration of pasture and hay lands caused by the droughts of 1930, 1933, and 1934.

REGIONAL ADJUSTMENT

The problem of regional distribution of production in connection with adjustment programs is difficult, and yet there is a need for modifying current programs to take account of regional differences. While it would appear at first glance that national adjustment in particular commodities on the basis of a flat percentage of base-period production would affect farmers in all regions alike, actually this method often results in undesired differentials as between regions. This is because of the wide diversity in physical conditions, in size and organization of farms, in trends of production, costs, yields, and the like, and the geographic variation in the price structure.

Production of a particular commodity may expand in one region, because of increase in prices or improvements in technic of production, whereas in other regions the production of the same commodity may remain stationary or contract. Regional shifts of this kind are inevitable, but at any particular time they may result in maladjustments among regions as well as for the Nation as a whole.

This is particularly true when such abrupt changes in domestic and foreign demand take place as have occurred in recent years. Thus, the rapid expansion of wheat acreage in the western edge of the Great Plains during the period from 1925 to 1930, while reasonable at that time, becomes questionable in view of the drastic decline of the export market for wheat since then. The use of a fixed base period as a basis for future adjustments tends to perpetuate regional maladjustments rather than to correct them.

A more flexible regional distribution of production might be obtained by using some combination of the base-period method and the system-of-farming method previously mentioned. A specific plan, for example, might call for a given percentage adjustment from a base period, with the further provision that not more than a certain maximum percentage of the crop acreage be devoted to key crops, and not less than a certain minimum percentage be in hay, pasture, soil-improving crops, or fallow, as determined by local committees. Such a method of adjustment would liberalize the base-period method, and would move toward the main objectives of a long-time program of conserving fertility and obtaining the best use of land according to specific conditions in the various regions and localities.

THE EVER-NORMAL GRANARY PLAN

The drought of 1934 emphasized the hazard of the weather factor in any effort to stabilize agricultural production. However, over a series of years, the weather factor tends to even up, and this fact may make it possible to supplement the adjustment programs with some plan for equalizing the effect of annual variations of yield that are due to causes beyond human control.

Such a plan should provide for adequate reserves of the major agricultural commodities to protect consumers from shortages, and should also provide that these reserves be held in such a way as to safeguard farmers from the price-depressing effect of surpluses.

The ever-normal granary plan would provide for crop loans in bumper years which would enable farmers to store the surplus portions of their crops, preferably on the farm, otherwise in local elevators, until the following year, when their adjusted production of new crops would make it possible for them to dispose of their holdings.

As a rule, loans should not be made during years of shortages and on the basis of temporarily high prices. The farm-storage plan has proved feasible for corn, which is readily stored and it might be feasible for wheat, if safer and more economical farm-storage methods are devised, or if some arrangement is worked out for storing farmer-owned wheat in commercial elevators.

PRODUCTION CONTROL NECESSARY TO PREVENT SURPLUSES

The plan must necessarily go hand in hand with an adjustment program, if it is not to encounter the difficulty of mounting surpluses.

Crop loans should be granted to farmers only upon condition that they participate in any adjustment program of the following year.

Such quantities of a given commodity as come into the possession of the Government through crop loans could be used in lieu of cash for benefit payments to participating farmers, and thus avoid a situation in which the Government would be holding large accumulations of commodities as a threat over the market.

Such a plan is of particular interest in view of the changed situation with regard to exports. When the export market was large, it served as a margin of safety with respect to supplies needed for domestic consumption. With its decline, this elastic margin has been largely removed, and some such plan as the ever-normal granary, providing for the establishment of adequate domestic reserves, is needed.

The Adjustment Administration has already had experience in making crop loans of the sort contemplated under the ever-normal granary plan. During the 1933-34 season, the Commodity Credit Corporation made loans on cotton and corn, with producers who received the loans agreeing to participate in production-control programs.

Producers of both commodities were benefited by these loans, in that large quantities of the commodities which would otherwise have hung over the market as price-depressing surpluses, remained in the hands of the producers themselves until the market was better able to absorb them. The corn loans were effective not only in withholding the surplus part of the large 1933 stocks from the market, but in establishing a reserve which became very valuable because of the

1934 drought. The Government has continued its loan policy for corn and cotton for the 1934-35 market season. This plan might be extended to other storable crops.

As a part of such a program the Government would need to guarantee private traders against the apprehension of sudden disruptive releases of stored goods. Commodities would be released only with due regard to the prevailing market conditions.

CHAPTER 21

FINANCIAL REPORT

The financial operations of the Agricultural Adjustment Administration are summarized in this chapter, both for the year 1934 and for the entire period that the act was in effect, May 12, 1933, through December 31, 1934.

I. FUNDS AND EXPENDITURES THEREFROM IN 1934

Operations of the Agricultural Adjustment Administration were financed from two main sources: Processing taxes and legislative appropriations.

The total made available from all sources during 1934 was \$879,-735,171.37. Of this, \$571,247,304.83 was expended during the year.

A balance of \$308,487,466.54 was available on January 1, 1935, for continuing adjustment operations.

The sources and amounts of funds made available to the Agricultural Adjustment Administration during 1934, the amounts expended in the period January 1, 1934, through December 31, 1934, and the balance on January 1, 1935, are shown in table 58.

TABLE 58.—*Funds available to the Agricultural Adjustment Administration in 1934, expenditures and balance on Jan. 1, 1935*

	Amount avail- able during 1934	Expenditures Jan. 1 to Dec. 31, 1934	Balance of funds available Jan. 1, 1935
Processing and other taxes ¹	\$500, 308, 154. 71	\$421, 127, 144. 92	³ \$79, 181, 009. 79
Appropriation for administrative expenses and rental and benefit payments under sec. 12 (a) of act ²	97, 754, 637. 07	2, 634, 769. 94	95, 119, 867. 13
Appropriation to carry into effect Jones-Connally amendment to Agricultural Adjustment Act.....	150, 000, 000. 00	48, 680, 312. 72	101, 319, 687. 28
Transfer under National Industrial Recovery Act to supplement processing taxes.....	37, 000, 000. 00	36, 995, 464. 29	4, 535. 71
Transfer under N. I. R. A. for administrative expenses in connection with codes.....	566, 000. 00	354, 874. 51	211, 125. 49
Allotment under Emergency Appropriation Act, fiscal year 1935, for drought relief.....	92, 804, 400. 00	61, 298, 681. 53	31, 505, 718. 47
Transfer from F. E. R. A. for administrative expenses on submarginal land projects.....	204, 434. 16	156, 056. 92	48, 377. 24
Proceeds of parity payments by distilled spirits in- dustry.....	1, 097, 545. 43	-----	1, 097, 545. 43
Total.....	879, 735, 171. 37	571, 247, 304. 83	³ 308, 487, 866. 54

¹ Processing and related tax collections are paid into the U. S. Treasury to meet advances made by the Treasury for rental and benefit and other disbursements ultimately financed by these tax collections.

² Expenditures from the \$100,000,000 appropriation during the calendar year 1933 amounted to \$2,245,362.93, leaving a balance of \$97,754,637.07 available during the calendar year 1934.

³ Less \$38,364,701 excess of expenditures over receipts in 1933.

PROCESSING TAX COLLECTIONS AND EXPENDITURES

The processing and other tax collections in 1934 and expenditures for rental and benefit payments and for other purposes for which processing tax funds are available are shown in table 59.

TABLE 59.—*Processing and other tax collections and expenditures therefrom in 1934*

COLLECTIONS		EXPENDITURES	
Cotton:		Cotton:	
Processing tax..	\$125,503,081.62	Benefit pay-ments.....	\$91,141,315.92
Bankhead gin-ning tax.....	121,505.95	Bankhead Act adminis-tration.....	3,141,689.17
	\$125,624,587.57		\$94,283,005.09
Wheat processing tax.....	132,602,160.32	Wheat benefit pay-ments.....	128,353,159.37
Corn processing tax.....	7,295,812.48	Surplus removal.....	5,591,297.28
Hogs processing tax.....	172,466,465.14		133,944,456.65
Tobacco:		Corn benefit payments.....	30,123,846.15
Processing tax..	\$29,344,548.30	Hogs:	
Tobacco Control Act sales tax..	1,065,013.05	Benefit pay-ments.....	\$92,026,016.73
	30,409,561.35	Surplus removal.....	12,614,552.16
Sugar processing tax.....	33,887,456.54		104,640,568.89
Peanuts processing tax.....	430,917.74	Tobacco:	
Unclassified.....	12,408,806.33	Benefit pay-ments.....	17,721,216.35
		Tobacco Control Act adminis-tration.....	111,790.88
Total.....	500,308,154.71		17,833,007.23
		Sugar.....	55,541.30
		Dairy products surplus removal.....	1,544,397.88
		Administrative expenses on volun-tary programs.....	20,252,534.31
		Refunds of taxes.....	18,449,787.42
		Total expenditures.....	421,127,144.92
		Balance.....	79,181,009.79

The expenditures listed in table 59 were made from advances by the United States Treasury in anticipation of the collection of processing and other taxes. These advances are discussed in more detail below.

II. FUNDS AND EXPENDITURES SINCE INCEPTION OF ACT

Since the Agricultural Adjustment Act went into effect on May 12, 1933, through December 31, 1934, expenditures by the Administration totaled \$752,420,441.38. The amount made available to the Administration during the period was \$1,316,311,174.59, including advances from the Treasury which are to be replaced by processing and other tax collections, leaving a balance on January 1, 1935, of \$563,890,733.21.

Table 60 lists the source and amount of each appropriation or fund which has been made available to the Administration, the expenditures that have been made therefrom, and the balance of funds unexpended.

¹ This amount is deducted to off-set an equal overstatement of collections by commodities resulting from the classification by commodity in 1934 of taxes collected in 1933.

TABLE 60.—Sources and amounts of funds made available to the Agricultural Adjustment Administration, amounts expended therefrom, and balances remaining available for expenditure from enactment of the law on May 12, 1933, through Dec. 31, 1934

Source of fund	Amount made available	Expenditures to Dec. 31, 1934	Balance of funds available Jan. 1, 1935
Advances from the Treasury in anticipation of processing tax collections ¹	\$924, 885, 000. 00	\$599, 943, 127. 66	\$324, 941, 872. 34
Advances from Treasury in anticipation of tax collections under Tobacco Control Act ¹	1, 753, 795. 00	111, 790. 88	1, 642, 004. 12
Appropriation for administrative expenses and rental and benefit payments under sec. 12 (a) of act. Warranted from processing taxes collected for purchase of surplus beet sugar.....	100, 000, 000. 00	4, 880, 132. 87	95, 119, 867. 13
Appropriation to carry into effect Jones-Connally amendment to Agricultural Adjustment Act.....	8, 000, 000. 00	-----	8, 000, 000. 00
Transfer under National Industrial Recovery Act to supplement processing taxes.....	150, 000, 000. 00	48, 680, 312. 72	101, 319, 687. 28
Transfer under N. I. R. A. for administrative expenses in connection with codes.....	37, 000, 000. 00	36, 995, 464. 29	4, 535. 71
Allotment under Emergency Appropriation Act fiscal year 1935, for drought relief.....	566, 000. 00	354, 874. 51	211, 125. 49
Transfer from F. E. R. A. for administrative expenses on submarginal land projects.....	92, 804, 400. 00	61, 298, 681. 53	31, 505, 718. 47
Proceeds of parity payments by distilled spirits industry.....	204, 434. 16	156, 056. 92	48, 377. 24
	1, 097, 545. 43	-----	1, 097, 545. 43
Total.....	1, 316, 311, 174. 59	752, 420, 441. 38	563, 890, 733. 21

¹ Processing and other taxes collected to Dec. 31, 1934, amounted to \$640,871,403.32.

Each item in table 60 is explained and amplified in the following paragraphs.

ADVANCES FROM THE TREASURY IN ANTICIPATION OF PROCESSING TAX COLLECTIONS

The Agricultural Adjustment Act provides that upon jointly estimated requirements made by the Secretary of Agriculture and the Secretary of the Treasury, funds will be advanced to the Secretary of Agriculture for carrying out the purposes of the act. Processing taxes when collected will be applied to offset such advances.

Advances by the Treasury totaled \$926,638,795. Processing taxes collected to offset these advances totaled \$640,871,403.32, leaving advances of \$285,767,392 not yet retired by processing and related tax collections. Of the total processing and related tax collections, \$94,492,724.36 represents floor stock taxes, all or part of which will be refunded when the taxes are terminated.

Expenditures from these advances are shown in table 61.

TABLE 61.—*Advances made to the Agricultural Adjustment Administration of the U. S. Treasury, and expenditures therefrom, through Dec. 31, 1934*

Advances in anticipation of processing tax collections.....	\$924, 885, 000. 00
Advances in anticipation of tax collections under Tobacco Control Act.....	1, 753, 795. 00
Total advances.....	926, 638, 795. 00
Expenditures:	
Rental and benefit payments: ¹	
Cotton.....	202, 546, 560. 79
Wheat.....	146, 749, 953. 87
Corn.....	30, 123, 846. 15
Hogs.....	92, 026, 016. 73
Tobacco.....	18, 995, 664. 48
Sugar.....	55, 541. 30
Total.....	490, 497, 583. 32
Removal of surplus:	
Wheat.....	6, 057, 227. 36
Hogs.....	46, 062, 952. 85
Dairy products.....	10, 958, 431. 25
Total.....	63, 078, 611. 46
Refund of taxes.....	18, 499, 822. 84
Administrative expenses:	
Voluntary adjustment programs.....	24, 725, 420. 87
Bankhead Act.....	3, 141, 689. 17
Tobacco Control Act.....	111, 790. 88
Total.....	27, 978, 900. 92
Total expenditures.....	600, 054, 918. 54
Balance, funds advanced but not expended.....	326, 583, 876. 46

ADVANCES FROM TREASURY IN ANTICIPATION OF TAX COLLECTIONS UNDER THE KERR TOBACCO CONTROL ACT

The Kerr Tobacco Control Act, approved June 28, 1934, authorized advances by the Treasury to the Secretary of Agriculture in anticipation of taxes levied under the act, and for the expenditure of such advances for administrative expenses in connection with the act, provided such taxes when collected be applied as required to offset these advances.

Pursuant to these provisions and prior to December 31, 1934, the Treasury advanced \$1,753,795 to the Secretary of Agriculture and \$111,790.88 had been expended therefrom. Taxes actually collected through December 31, 1934, amounted to \$1,065,013.05 and exceeded expenditures by \$953,222.17.

APPROPRIATION FOR ADMINISTRATIVE EXPENSES AND RENTAL AND BENEFIT PAYMENTS UNDER SECTION 12 (A) OF THE AGRI- CULTURAL ADJUSTMENT ACT

The Agricultural Adjustment Act appropriated \$100,000,000 for the payment of administrative expenses and rental and benefit payments. Expenditures from this fund through December 31, 1934, amounted to \$4,880,132.87, leaving a balance of \$95,119,867.13 available for future

¹ For a statement showing rental and benefit payments analyzed by commodities and States, see p. 350.

disbursements. Expenditures through December 31, 1934, consisted exclusively of administrative expenses, although only a part of these expenses were paid from this fund. Expenses directly connected with programs for the production adjustment of basic commodities on which processing taxes existed were paid from funds advanced in anticipation of processing tax collections. Other administrative expenses not directly connected with such adjustment programs are paid from this \$100,000,000 appropriation.

WARRANTED FROM PROCESSING TAXES COLLECTED FOR PURCHASES OF SURPLUS BEET SUGAR

Section 16 (d) of the Agricultural Adjustment Act, as amended by section 17 of the Jones-Costigan Sugar Act, authorized the Secretary of Agriculture to purchase with available tax proceeds a maximum amount of 300,000 tons (raw value) of beet sugar from such domestically produced surplus stocks as exist in the United States. For the purchase of such surplus beet sugar \$8,000,000 has been set aside and is available from the proceeds of processing taxes. No expenditures had been made therefrom through December 31, 1934.

APPROPRIATION TO CARRY INTO EFFECT THE JONES-CONNALLY AMENDMENT TO THE AGRICULTURAL ADJUSTMENT ACT

Congress on May 25, 1934, appropriated \$100,000,000 to enable the Secretary to carry out the provisions of section 2 of the Jones-Connally Cattle Act, and \$50,000,000 for the execution of section 6 of that act.⁹ The \$100,000,000 appropriation is available in part to finance surplus and production reductions in the dairy and beef cattle industries and to support and balance the markets for those industries. Part of the expenditures in connection with the emergency cattle-purchase program have been financed from this fund. The \$50,000,000 is available also in part for financing the distribution by the Federal Surplus Relief Corporation of dairy and beef products for relief purposes and the elimination of diseased dairy and beef cattle.

Expenditures from the combined fund of \$150,000,000 through December 31, 1934, were made as shown in the following tabulation:

Original appropriations.....		\$150, 000, 000. 00
Emergency cattle purchases.....	\$44, 072, 735. 00	
Purchase of surplus dairy products.....	1, 392, 061. 82	
Indemnities paid for elimination of dis- eased cattle.....	1, 695, 844. 62	
Administrative expenses.....	1, 519, 671. 28	
Total expenditures.....		48, 680, 312. 72
Unexpended balance.....		101, 319, 687. 28

TRANSFER UNDER NATIONAL INDUSTRIAL RECOVERY ACT TO SUP- PLEMENT PROCESSING TAXES

To supplement proceeds from processing taxes on corn and hogs, the President on November 29, 1933, allocated \$37,000,000 to the Agricultural Adjustment Administration from funds appropriated to carry out the purposes of section 220 of the National Industrial Recovery Act. From this allocation \$36,995,464.29 has been ex-

⁹ Public Res. No. 27, 73d Cong.

pended through December 31, 1934, in payment of corn benefit payments under the 1934 corn-hog program, and \$4,535.71 remained available for future expenditure.

TRANSFER UNDER NATIONAL INDUSTRIAL RECOVERY ACT FOR ADMINISTRATIVE EXPENSES IN CONNECTION WITH CODES

The formulation and administration of certain codes of fair competition under the National Industrial Recovery Act have been delegated by presidential order to the Agricultural Adjustment Administration. For administrative expenses in connection with these activities \$566,000 has been made available to the Agricultural Adjustment Administration by the National Industrial Recovery Administration. Expenditures from this fund through December 31, 1934, amounted to \$354,874.51, leaving a balance of \$211,125.49 available for future expenditure.

ALLOTMENT UNDER EMERGENCY APPROPRIATION ACT, FISCAL YEAR 1935, FOR DROUGHT RELIEF

The Emergency Appropriation Act for the fiscal year 1935 authorized the President to allocate \$525,000,000 for supplementing the appropriations previously made for emergency and additional purposes, such as the purchase, sale, gift or other disposition of seed and feed, are in connection with freight and summer fallowing. Of this amount \$97,780,000 was allocated to the Secretary of Agriculture, who in turn allocated \$92,804,400 to the Agricultural Adjustment Administration for expenditures for drought-relief purposes. Expenditures through December 31, 1934, have been made from this fund as follows:

Total fund.....	\$92, 804, 400. 00
Less expenditures:	
Emergency cattle-purchase program.....	45, 936, 865. 50
Emergency purchase of sheep and goats.....	2, 294, 237. 00
Purchase of seed.....	11, 826, 603. 09
Administrative expenses.....	1, 240, 975. 94
Total expenditures.....	61, 298, 681. 53
Unexpended balance.....	31, 505, 718. 47

TRANSFER FROM FEDERAL EMERGENCY RELIEF ADMINISTRATION FOR ADMINISTRATIVE EXPENSES ON SUBMARGINAL LAND PROJECTS

The Program Planning Division of the Agricultural Adjustment Administration is cooperating with the Federal Emergency Relief Administration and other Government agencies for the removal of submarginal land from agricultural production. The Federal Emergency Relief Administration has advanced \$204,434.16 to the Agricultural Adjustment Administration for expenditures in connection with this program. Expenditures by the Agricultural Adjustment Administration through December 31, 1934, amounted to \$156,056.92.

PROCEEDS OF PARITY PAYMENTS BY DISTILLED-SPIRITS INDUSTRY

A marketing agreement between the Secretary of Agriculture and members of the distilled-spirits industry, in effect from December 13, 1933, to April 17, 1934, provided for certain payments by the distilled-spirits industry to a fund to be used in connection with grain production-adjustment programs. Deposits made into this fund through December 31, 1934, amounted to \$1,097,545.43, but no expenditures had been made therefrom.

III. COTTON OPTIONS

The Secretary of Agriculture, pursuant to part 1 of the Agricultural Adjustment Act, acquired from the Farm Credit Administration spot cotton and cotton futures contracts representing a total of approximately 2,450,000 bales of cotton. Substantially all of this cotton was optioned to cotton producers cooperating in the 1933 cotton adjustment program at 6 cents per pound.

A cotton producers' pool was established on January 8, 1934, by order of the Secretary, and holders of the cotton options described were given the privilege of placing their options in this pool. Options representing approximately 1,950,000 bales were placed in the pool. Substantially all of the remaining options have been exercised by their holders. By December 31, 1934, approximately 485,000 bales of cotton had been sold by option holders and \$12,217,214.53 had been paid to such option holders. The cotton producers' pool, through December 31, 1934, advanced a total of \$38,947,454.18 to the members of the pool on the basis of 4 cents per pound on cotton covered by options which had been placed in the pool by such members.

IV. COLLECTION OF PROCESSING AND RELATED TAXES

Purposes, operation, and effects of the processing taxes are discussed in detail in another section of this report. The proceeds of these taxes are appropriated, under section 12 (a) of the Agricultural Adjustment Act, for effectuating the purposes of the act. Table 62 presents an account of the processing and related tax collections by commodities, as reported by the Bureau of Internal Revenue, through December 31, 1934.

TABLE 62.—*Collection of processing and related taxes, cumulative to Dec. 31, 1934*

Commodity	Date tax effective	Collections to Dec. 31, 1934
Wheat.....	July 9, 1933	\$181,601,246.57
Cotton.....	Aug. 1, 1933	193,721,656.33
Tobacco.....	Oct. 1, 1933	34,370,927.70
Field corn.....	Nov. 5, 1933	8,198,128.33
Hogs.....	do	176,035,419.71
Paper and jute.....	Dec. 1, 1933	11,349,884.70
Sugar.....	June 8, 1934	33,965,176.91
Tobacco producers' sales tax.....	June 28, 1934	1,071,327.37
Cotton ginning tax.....	Apr. 21, 1934	122,302.10
Peanuts.....	Oct. 1, 1934	435,333.60
Total collections.....		640,871,403.32

V. EXPENDITURES SUMMARIZED BY CHARACTER

Expenditures under the Agricultural Adjustment Act, for rental and benefit payments under production-control contracts, for removal of surplus agricultural commodities from ordinary commercial channels, and for general administrative expenses in connection with agricultural adjustment under the act, are summarized in table 63, by character.

TABLE 63.—*Expenditures under the Agricultural Adjustment Act, by character and by commodity, through Dec. 31, 1934*

Character	Amount	Character	Amount
Administration:		Removal of surplus:	
Washington, D. C.	\$16,344,974.82	Hogs.....	\$46,062,952.85
Field.....	19,839,806.02	Wheat.....	6,057,227.36
Total.....	36,184,780.84	Butter and cheese.....	12,350,493.07
Rental and benefit:		Cattle.....	91,705,445.12
Cotton.....	202,546,560.79	Sheep and goats.....	2,294,237.00
Wheat.....	146,749,953.87	Seeds.....	11,826,603.09
Tobacco.....	18,995,664.48	Total.....	170,296,958.49
Corn-hog.....	159,145,327.17	Grand total.....	733,974,786.94
Sugar.....	55,541.30		
Total.....	1,527,493,047.61		

¹ This figure does not include payment with respect to cotton options.

APPENDIXES

APPENDIX A—THE ACT AS AMENDED

EXHIBIT 1.—COMPILATION OF THE AGRICULTURAL ADJUSTMENT ACT AS AMENDED AND ACTS RELATING THERETO

PREFATORY NOTE

Throughout the text of this document italics are used to indicate matter added by way of amendment since the passage of the original Agricultural Adjustment Act, Public, No. 10, 73d Congress, Title I, approved May 12, 1933.

Two forms of notes have been used. Those of an explanatory nature are made footnotes and are numbered consecutively. Those containing the statutory citations for the amendatory legislation are placed in the body of the act immediately subsequent to the sections or paragraphs which they amend. In instances where the language of the original act was stricken or changed, comparative prints are used, in which heavy brackets indicate deleted matter, and new matter is set forth in italics.

AGRICULTURAL ADJUSTMENT ACT, AS AMENDED, AS OF JUNE 29, 1934

AN ACT

To relieve the existing national economic emergency by increasing agricultural purchasing power to raise revenue for extraordinary expenses incurred by reason of such emergency, to provide emergency relief with respect to agricultural indebtedness, to provide for the orderly liquidation of joint-stock land banks, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

TITLE I—AGRICULTURAL ADJUSTMENT ¹

DECLARATION OF EMERGENCY

That the present acute economic emergency being in part the consequence of a severe and increasing disparity between the prices of agricultural and other commodities, which disparity has largely destroyed the purchasing power of farmers for industrial products, has broken down the orderly exchange of commodities, and has seriously impaired the agricultural assets supporting the national credit structure, it is hereby declared that these conditions in the basic industry of agriculture have affected transactions in agricultural commodities with a national public interest, have burdened and obstructed the normal currents of commerce in such commodities, and render imperative the immediate enactment of title I of this Act.

DECLARATION OF POLICY

SEC. 2. It is hereby declared to be the policy of Congress—

(1) To establish and maintain such balance between the production and consumption of agricultural commodities, and such marketing conditions therefor, as will reestablish prices to farmers at a level that will give agricultural commodities a purchasing power with respect to articles that farmers buy, equivalent to the purchasing power of agricultural commodities in the base period. The base period in the case of all agricultural commodities except tobacco shall be the prewar period, August 1909–July 1914. In the case of tobacco, the base period shall be the postwar period, August 1919–July 1929.

¹ Original Act was Title I of Public, No. 10, 73d Congress (H. R. 3535), 48 Stat. 31 (1933); 7 U. S. C. 601 et seq. By sec. 8 (a) of the National Industrial Recovery Act, Title I may be referred to as the "Agricultural Adjustment Act." (For text of sec. 8, see p. 328.)

(2) To approach such equality of purchasing power by gradual correction of the present inequalities therein at as rapid a rate as is deemed feasible in view of the current consumptive demand in domestic and foreign markets.

(3) To protect the consumers' interest by readjusting farm production at such level as will not increase the percentage of the consumers' retail expenditures for agricultural commodities, or products derived therefrom, which is returned to the farmer, above the percentage which was returned to the farmer in the prewar period, August 1909–July 1914.

PART 1—COTTON OPTION CONTRACTS

SEC. 3. The Federal Farm Board and all departments and other agencies of the Government, not including the Federal intermediate credit banks, are hereby directed—

(a) To sell to the Secretary of Agriculture at such price as may be agreed upon, not in excess of the market price, all cotton now owned by them.

(b) To take such action and to make such settlements as are necessary in order to acquire full legal title to all cotton on which money has been loaned or advanced by any department or agency of the United States, including futures contracts for cotton or which is held as collateral for loans or advances and to make final settlement of such loans and advances as follows:

(1) In making such settlements with regard to cotton, including operations to which such cotton is related, such cotton shall be taken over by all such departments or agencies other than the Secretary of Agriculture at a price or sum equal to the amounts directly or indirectly loaned or advanced thereon and outstanding, including loans by the Government department or agency and any loans senior thereto, plus any sums required to adjust advances to growers to 90 per centum of the value of their cotton at the date of its delivery in the first instance as collateral to the department or agency involved, such sums to be computed by subtracting the total amount already advanced to growers on account of pools of which such cotton was a part, from 90 per centum of the value of the cotton to be taken over as of the time of such delivery as collateral, plus unpaid accrued carrying charges and operating costs on such cotton, less, however, any existing assets of the borrower derived from net income, earnings, or profits arising from such cotton, and from operations to which such cotton is related; all as determined by the department or agency making the settlement.

(2) The Secretary of Agriculture shall make settlements with respect to cotton held as collateral for loans or advances made by him on such terms as in his judgment may be deemed advisable, and to carry out the provisions of this section, is authorized to indemnify or furnish bonds to warehousemen for lost warehouse receipts and to pay the premiums on such bonds.

When full legal title to the cotton referred to in (b) has been acquired, it shall be sold to the Secretary of Agriculture for the purposes of this section, in the same manner as provided in (a).

(c) The Secretary of Agriculture is hereby authorized to purchase the cotton specified in paragraphs (a) and (b).

SEC. 4. (a) The Secretary of Agriculture shall have authority to borrow money upon all cotton in his possession or control and may, at his discretion, deposit as collateral for such loans the warehouse receipts for such cotton.

(b) *The Secretary of the Treasury is authorized to advance, in his discretion, out of any money in the Treasury not otherwise appropriated, the sum of \$100,000,000 to be available, until March 1, 1936, to the Secretary of Agriculture, for paying off any debt or debts which may have been or may be incurred by the Secretary of Agriculture and discharging any lien or liens which may have arisen or may arise pursuant to part 1 of this title, for protecting title to any cotton which may have been or may be acquired by the Secretary of Agriculture under authority of part 1 of this title, and for paying any expenses (including, but not limited to, warehouse charges, insurance, salaries, interest, costs, and commissions) incident to carrying, handling, insuring, and marketing of said cotton and for the purposes described in subsection (e) of this section.*

(c) *The funds authorized by subsection (b) of this section shall be made available to the Secretary of Agriculture from time to time upon his request and with the approval of the Secretary of the Treasury. Each such request shall be accompanied by a statement showing by weight and average grade and staple the quantity of cotton held by the Secretary of Agriculture and the approximate aggregate market value thereof.*

(d) *It is the purpose of subsections (b) and (c) to provide an alternative method to that provided by subsection (a), for enabling the Secretary of Agriculture to finance the acquisition, carrying, handling, insuring, and marketing of cotton acquired by him under authority of section 3 of this Act. The Secretary of Agriculture may at his discretion make use of either or both of the methods provided in this section for obtaining funds for the purposes hereinabove enumerated.*

(e) *The Secretary of Agriculture is authorized to use in his discretion any funds obtained by him pursuant to the provisions of subsection (a) or (b) of this section or of section 5 for making advances to any agency which may have been or may be established by the Secretary of Agriculture for the handling, carrying, insuring, or marketing of any cotton acquired by the Secretary of Agriculture, to enable any such agency to perform, exercise, and discharge any of the duties, privileges, and functions which such agency may be authorized to perform, exercise, or discharge.*

(f) *The proceeds derived from the sale of cotton shall be held for the Secretary of Agriculture by the Treasurer of the United States in a special deposit account and shall be used by the Secretary of Agriculture to discharge the obligations incurred under authority of part 1 of this title. Whenever any cotton shall be marketed the net proceeds (after discharge of other obligations incurred with respect thereto) derived from the sale thereof shall be used, to the extent required, to reimburse the Treasury for such portion of the funds hereby provided for as shall have been used, which shall be covered into the Treasury as a miscellaneous receipt. If when all of the cotton acquired by the Secretary of Agriculture shall have been marketed and all of the obligations incurred with respect to such cotton shall have been discharged, and the Treasury reimbursed for any and all sums which may have been advanced pursuant to subsection (b), there shall remain any balance in the hands of the Secretary of Agriculture, such balance shall be covered into the Treasury as miscellaneous receipts.*

As amended by Title II of the Emergency Appropriation Act, fiscal year 1935, Public, No. 412, 73d Congress, approved June 19, 1934.

SEC. 5. The Reconstruction Finance Corporation is hereby authorized and directed to advance money and to make loans to the Secretary of Agriculture for the purpose of providing funds with which to enable the Secretary of Agriculture to perform the duties and functions which he is directed or authorized to perform under the provisions of part 1 of this title provided such advance of money or such loans shall not be for amounts in excess of the market value of the cotton, or the interest of the Secretary of Agriculture in the cotton, against which the advance or loan is to be made at the time such advance or loan may be applied for by the Secretary of Agriculture, plus costs, expenses, and commissions incurred incidental to handling, carrying, and marketing of such cotton. The Secretary of Agriculture shall not be required to pledge or deposit warehouse receipts or other evidences of title to cotton as security for any advance of money or loans made pursuant hereto, but it shall be sufficient if the Secretary shall give to the Reconstruction Finance Corporation a written statement showing the quantity of cotton by weight and the average grade and staple of the cotton against which the advance or loan is to be made. The amount of notes, bonds, debentures, and other obligations which the Reconstruction Finance Corporation is authorized and empowered to issue and to have outstanding at any one time under existing law is hereby increased by an amount sufficient to carry out the provisions of this section.

As amended by Title II of the Emergency Appropriation Act, fiscal year 1935, Public, No. 412, 73d Congress, approved June 19, 1934.

A comparative print of the section prior to and after its amendment is as follows:

SEC. 5. The Reconstruction Finance Corporation is hereby authorized and directed to advance money and to make loans to the Secretary of Agriculture [to acquire such cotton and to pay the classing, carrying, and merchandising costs thereon, in such amounts and upon such terms as may be agreed upon by the Secretary and the Reconstruction Finance Corporation, with such warehouse receipts as collateral security:] for the purpose of providing funds with which to enable the Secretary of Agriculture to perform the duties and functions which he is directed or authorized to perform under the provisions of part 1 of this title, provided such advance of money or such loans shall not be for amounts in excess of the market value of the cotton, or the interest of the Secretary of Agriculture in the cotton, against which the advance or loan is to be made at the time such advance or loan may be applied for by the Secretary of Agriculture, plus costs, expenses, and commissions incurred incidental to handling, carrying, and marketing of such cotton. [Provided, however, That in any instance where it is impossible or impracticable for the Secretary to deliver such warehouse receipts as collateral security for the advances and loans herein provided to be made, the Reconstruction Finance Corporation may accept in lieu of all or any part thereof such other security as it may consider acceptable for the purposes aforesaid, including an assignment or assignments of the equity and interest of the Secretary in warehouse receipts pledged to secure other indebtedness.] The Secretary of Agriculture shall not be required to pledge or deposit warehouse receipts or other evidences of title to cotton as security for any advance of money or loans made pursuant hereto, but it shall be sufficient if the Secretary shall give to the Reconstruction Finance Corporation a written statement showing the quantity of cotton by weight and the average grade and staple of the cotton against which the advance or loan is to be made. The amount of notes, bonds, debentures, and other [such] obligations which the Reconstruction Finance Corporation is authorized and empowered to issue and to have outstanding at any one time under existing law is hereby increased by an amount sufficient to carry out the provisions of this section.

SEC. 6. (a) The Secretary of Agriculture is hereby authorized to enter into option contracts with the producers of cotton to sell to any such producer an amount of cotton to be agreed upon not in excess of the amount of reduction in production of cotton by such producer below the amount produced by him in the preceding crop year, in all cases where such producer agrees in writing to reduce the amount of cotton produced by him in 1933, below his production in the previous year, by not less than 30 percentum, without increase in commercial fertilization per acre.

(b) To any such producer so agreeing to reduce production the Secretary of Agriculture shall deliver a nontransferable-option contract agreeing to sell to said producer an amount, equivalent to the amount of his agreed reduction, of the cotton in the possession and control of the Secretary.

(c) The producer is to have the option to buy said cotton at the average price paid by the Secretary for the cotton procured under section 3, and is to have the right at any time up to January 1, 1934, to exercise his option, upon proof that he has complied with his contract and with all the rules and regulations of the Secretary of Agriculture with respect thereto, by taking said cotton upon payment by him of his option price and all actual carrying charges on such cotton; or the Secretary may sell such cotton for the account of such producer, paying him the excess of the market price at the date of sale over the average price above referred to after deducting all actual and necessary carrying charges: *Provided*, That in no event shall the producer be held responsible or liable for financial loss incurred in the holding of such cotton or on account of the carrying charges therein: *Provided further*, That such agreement to curtail cotton production shall contain a further provision that such cotton producer shall not use the land taken out of cotton production for the production for sale, directly or indirectly, of any other nationally produced agricultural commodity or product.

(d) If any cotton held by the Secretary of Agriculture is not disposed of under subsection (c), the Secretary is authorized to enter into similar option contracts with respect to such cotton, conditioned upon a like reduction of production in 1934, and permitting the producer in each case to exercise his option at any time up to January 1, 1935.

SEC. 7. *The Secretary shall sell the cotton held by him at his discretion, but subject to the foregoing provisions: Provided, That he shall dispose of all cotton held by him by March 1, 1936: Provided further, That notwithstanding the provisions of section 6, the Secretary shall have authority to enter into option contracts with producers of cotton to sell to the producers such cotton held by him, in such amounts and at such prices and upon such terms and conditions as the Secretary may deem advisable, in combination with rental or benefit payments provided for in part 2 of this title.*

Notwithstanding any provisions of existing law, the Secretary of Agriculture may in the administration of the Agricultural Adjustment Act make public such information as he deems necessary in order to effectuate the purposes of such Act.

As amended by sec. 221 of the National Industrial Recovery Act, Public, No. 67, 73d Congress, 48 Stat. 210; 15 U. S. C. § 607.

The amendment struck out the entire section and substituted the above in lieu thereof. A comparative print of sec. 7 prior to and after its amendment is as follows:

"SEC. 7. The Secretary shall sell the cotton held by him at his discretion, but subject to the foregoing provisions: *Provided*, That he shall dispose of all cotton held by him by March 1, 1936: *Provided further*, That *notwithstanding the provisions of section 6*, the Secretary shall have authority to enter into [additional] option contracts [for so much of such cotton as is not necessary to comply with the provisions of section 6], with producers of cotton to sell to the producers such cotton held by him, in such amounts and at such prices and upon such terms and conditions as the Secretary may deem advisable, in combination with rental or benefit payments [as] provided for in part 2 of this title."

Notwithstanding any provisions of existing law, the Secretary of Agriculture may in the administration of the Agricultural Adjustment Act make public such information as he deems necessary in order to effectuate the purposes of such Act.

PART 2—COMMODITY BENEFITS

GENERAL POWERS

SEC. 8.² In order to effectuate the declared policy, the Secretary of Agriculture shall have power—

(1) To provide for reduction in the acreage or reduction in the production for market, or both, of any basic agricultural commodity, through agreements with producers or by other voluntary methods, and to provide for rental or benefit payments in connection therewith or upon that part of the production of any

² Sec. 3741 of the Revised Statutes of the United States and secs. 114 and 115 of the Criminal Code of the United States are made inapplicable to contracts made by Congressmen under the Agricultural Adjustment Act by Public, No. 86, 73d Congress, as amended by National Housing Act, Public No. 479, 73d Congress. See p. 329.

basic agricultural commodity required for domestic consumption, in such amounts as the Secretary deems fair and reasonable, to be paid out of any moneys available for such payments; and, in the case of sugar beets or sugarcane, in the event that it shall be established to the satisfaction of the Secretary of Agriculture that returns to growers or producers, under the contracts for the 1933-1934 crop of sugar beets or sugarcane, entered into by and between the processors and producers and/or growers thereof, were reduced by reason of the payment of the processing tax, and/or the corresponding floor stocks tax, or sugar beets or sugarcane, in addition to the foregoing rental or benefit payments, to make such payments, representing in whole or in part such tax, as the Secretary deems fair and reasonable, to producers who agree, or have agreed, to participate in the program for reduction in the acreage or reduction in the production for market, or both, of sugar beets or sugarcane. Under regulations of the Secretary of Agriculture requiring adequate facilities for the storage of any non-perishable agricultural commodity on the farm, inspection and measurement of any such commodity so stored, and the locking and sealing thereof, and such other regulations as may be prescribed by the Secretary of Agriculture for the protection of such commodity and for the marketing thereof, a reasonable percentage of any benefit payment may be advanced on any such commodity so stored. In any such case, such deduction may be made from the amount of the benefit payment as the Secretary of Agriculture determines will reasonably compensate for the cost of inspection and sealing, but no deduction may be made for interest.

As amended by sec. 14 of the Jones-Costigan Sugar Act, Public, No. 213, 73d Congress, approved May 9, 1934.

(2) *After due notice and opportunity for hearing, to enter into marketing agreements with processors, producers, associations of producers, and others engaged in the handling of any agricultural commodity or product thereof, in the current of or in competition with, or so as to burden, obstruct, or in any way affect, interstate or foreign commerce.* The making of any such agreement shall not be held to be in violation of any of the antitrust laws of the United States, and any such agreement shall be deemed to be lawful: *Provided*, That no such agreement shall remain in force after the termination of this Act. For the purpose of carrying out any such agreement the parties thereto shall be eligible for loans from the Reconstruction Finance Corporation under section 5 of the Reconstruction Finance Corporation Act. Such loans shall not be in excess of such amounts as may be authorized by the agreements.

As amended by sec. 7 of the Jones-Connally Cattle Act, Public, No. 142, 73d Congress, approved April 7, 1934.

A comparative print of the first sentence of subsection (2) prior to and after its amendment is as follows:
After due notice and opportunity for hearing, to [To] enter into marketing agreements with processors, producers, associations of producers, and others engaged in the handling [, in the current of interstate or foreign commerce] of any agricultural commodity or product thereof, [after due notice and opportunity for hearing to interested parties] in the current of or in competition with, or so as to burden, obstruct, or in any way affect, interstate or foreign commerce.

(3) To issue licenses permitting processors, associations of producers, and others to engage in the handling, in the current of interstate or foreign commerce, of any agricultural commodity or product thereof, or any competing commodity or product thereof. Such licenses shall be subject to such terms and conditions, not in conflict with existing Acts of Congress or regulations pursuant thereto, as may be necessary to eliminate unfair practices or charges that prevent or tend to prevent the effectuation of the declared policy and the restoration of normal economic conditions in the marketing of such commodities or products and the financing thereof. The Secretary of Agriculture may suspend or revoke any such license, after due notice and opportunity for hearing, for violations of the terms or conditions thereof. Any order of the Secretary suspending or revoking any such license shall be final if in accordance with law. Any such person engaged in such handling without a license as required by the Secretary under this section shall be subject to a fine of not more than \$1,000 for each day during which the violation continues.

(4) To require any licensee under this section to furnish such reports as to quantities of agricultural commodities or products thereof bought and sold and the prices thereof, and as to trade practices and charges, and to keep such systems of accounts, as may be necessary for the purpose of part 2 of this title.

(5) No person engaged in the storage in a public warehouse of any basic agricultural commodity in the current of interstate or foreign commerce, shall deliver any such commodity upon which a warehouse receipt has been issued and is outstanding, without prior surrender and cancellation of such warehouse receipt.

Any person violating any of the provisions of this subsection shall, upon conviction, be punished by a fine of not more than \$5,000, or by imprisonment for not more than two years, or both. The Secretary of Agriculture may revoke any license issued under subsection (3) of this section, if he finds, after due notice and opportunity for hearing, that the licensee has violated the provisions of this subsection.

Sec. 8a. (1) *Having due regard to the welfare of domestic producers and to the protection of domestic consumers and to a just relation between the prices received by domestic producers and the prices paid by domestic consumers, the Secretary of Agriculture may, in order to effectuate the declared policy of this Act, from time to time, by orders or regulations—*

(A) (i) *Forbid processors, handlers of sugar, and others from importing sugar into continental United States for consumption, or which shall be consumed, therein, and/or from transporting to, receiving in, processing or marketing in, continental United States, and/or from processing in any area to which the provisions of this title with respect to sugar beets and sugarcane may be made applicable, for consumption in continental United States, sugar from the Virgin Islands, the Philippine Islands, the Canal Zone, American Samoa, the island of Guam, and from foreign countries, including Cuba, respectively, in excess of quotas fixed by the Secretary of Agriculture, for any calendar year, based on average quantities therefrom brought into or imported into continental United States for consumption, or which was actually consumed, therein, during such three years, respectively, in the years 1925–1933, inclusive, as the Secretary of Agriculture may, from time to time, determine to be the most representative respective three years, adjusted, together with the quotas established pursuant to paragraph (ii), (in such manner as the Secretary shall determine) to the remainder of the total estimated consumption requirements of sugar for continental United States, determined pursuant to subsection (2) of this section, after deducting therefrom the quotas for continental United States, provided for by paragraph (B) of this subsection: Provided, however, That in such quotas there may be included, in the case of the Virgin Islands, the Philippine Islands, the Canal Zone, American Samoa, and the island of Guam, direct-consumption sugar up to an amount not exceeding the respective quantities of direct-consumption sugar therefrom brought into or imported into continental United States for consumption, or which was actually consumed, therein during the year 1931, 1932, or 1933, whichever is greater, and in the case of Cuba, direct-consumption sugar up to an amount not exceeding 22 per centum of the quota established for Cuba: And provided further, That any imported sugar, with respect to which a drawback of duty is allowed, under the provisions of section 313 of the Tariff Act of 1930, shall not be charged against the quota established by the Secretary of Agriculture hereunder for the country from which such sugar was imported, and the Secretary of Agriculture may, by orders or regulations, readjust any quota subject to the provisions of this section, except quotas fixed by paragraph (B) of this subsection; and may allot (or appoint an officer, including the Governor General of the Philippine Islands for that area, in his name to allot) any quota, and readjust any such allotment, from time to time, among the processors, handlers of sugar and others; and/or*

(ii) *Forbid processors, handlers of sugar, and others from transporting to, receiving in, processing or marketing in, continental United States, and/or from processing in the Territory of Hawaii or Puerto Rico for consumption in continental United States, sugar from the Territory of Hawaii or Puerto Rico, in excess of quotas fixed by the Secretary of Agriculture, for any calendar year, based on average quantities therefrom brought into continental United States for consumption, or which was actually consumed, therein during such three years, respectively, in the years 1925–1933, inclusive, as the Secretary of Agriculture may, from time to time, determine to be the most representative respective three years, adjusted, together with the quotas established pursuant to paragraph (i), (in such manner as the Secretary shall determine) to the remainder of the total estimated consumption requirements of sugar for continental United States, determined pursuant to subsection (2) of this section, after deducting therefrom the quotas for continental United States, provided for by paragraph (B) of this subsection: Provided, however, That in such quotas there may be included direct-consumption sugar up to an amount not exceeding the respective quantities of direct-consumption sugar therefrom brought into continental United States for consumption, or which was actually consumed, therein during the year 1931, 1932, or 1933, whichever is greater, and the Secretary of Agriculture may, by orders or regulations, allot such quotas and readjust any such allotment, from time to time, among the processors handlers of sugar, and others; and/or*

(B) *Forbid processors, handlers of sugar, and others from marketing in, or in the current of, or in competition with, or so as to burden, obstruct, or in any way affect, interstate or foreign commerce, sugar manufactured from sugar beets and/or sugarcane,*

produced in the continental United States beet-sugar-producing area, the States of Louisiana and Florida, and any other State or States in excess of the following quotas, for any calendar year, except as provided for in subsection (2) of this section: United States beet-sugar area, one million five hundred and fifty thousand short tons raw value; the States of Louisiana and Florida, except as may be provided under paragraph (C) of this subsection, two hundred and sixty thousand short tons raw value; and the Secretary of Agriculture may, by orders or regulations, allot such quotas and readjust any such allotment, from time to time, among the processors, handlers of sugar, and others; and/or

(C) For any calendar year, determine the quota, but not less than the quota provided in paragraph (B), for any area producing less than two hundred and fifty thousand long tons of sugar raw value during the next preceding calendar year; and/or

(D) Establish a separate quota or quotas for edible molasses and/or sirup of cane juice produced in continental United States, in addition to, and/or for edible molasses, sirups, and sugar mixtures produced in any other area or areas to which this title relates as part of or in addition to, the quotas established pursuant to paragraphs (A) to (C), inclusive, of this subsection, for use as such and not for the extraction of sugar.

(2) (A) The consumption requirements of sugar for continental United States, for the calendar year 1934, and for each succeeding calendar year, shall be determined by the Secretary of Agriculture from available statistics of the Department of Agriculture. The consumption requirements so determined shall, at such intervals as the Secretary finds necessary to effectuate the declared policy and the purposes of this Act, be adjusted by him to meet the actual requirements of the consumer as determined by the Secretary.

(B) In the event that available statistics of the Department of Agriculture during the course of any calendar year indicate that the consumption requirements of sugar for continental United States for such calendar year will exceed the amount of the consumption requirements determined for that year, the Secretary of Agriculture may prorate such estimated excess amount on the basis of the respective quotas determined by and pursuant to subsection (1) of this section: Provided, however, That for each calendar year there shall be allotted to continental United States not less than 30 per centum of any amount of consumption requirements therefor above six million four hundred and fifty-two thousand short tons raw value.

(C) In the event that available statistics of the Department of Agriculture during the course of any calendar year indicate that the consumption requirements of sugar for continental United States for such year will be less than the amount of the consumption requirements determined for that year, the amount of such deficiency may be proportionately deducted from the respective quotas determined by and pursuant to paragraph (A) of subsection (1) of this section.

(D) If, during any calendar year, any producing area is unable to produce and deliver its full quota of sugar, the Secretary of Agriculture may prorate this deficiency among the other areas on the basis of their respective quotas and ability to supply the deficiency.

(E) Notwithstanding the provisions of paragraphs (A) to (C), inclusive, of subsection (1) of this section, the Secretary of Agriculture may, in order to effectuate the declared policy of this Act, from time to time, by orders or regulations, deduct from the quotas for production, importing, receiving, and/or marketing, and/or from the allotments thereof, established pursuant to said paragraphs, in any given year, an amount for each year, respectively, representing the surplus stocks of sugar produced in that area, or a portion of the total surplus stocks of sugar produced in that area, in whole or in part, which may have accumulated in the year next preceding, over and above the quotas established for such year.

(3) In order more fully to effectuate the declared policy of this Act, as set forth in its declaration of policy, and to insure the equitable division between producers and/or growers and/or the processors of sugar beets or sugarcane of any of the proceeds which may be derived from the growing, processing and/or marketing of such sugar beets or sugarcane, and the processing and/or marketing of the products and byproducts thereof, all agreements authorized by this Act relating to sugar beets, sugarcane, or the products thereof may contain provisions which will limit or regulate child labor, and will fix minimum wages for workers or growers employed by the producers and/or processors of sugar beets and/or sugarcane who are parties to such agreements; and the Secretary, upon the request of any producer, or grower, or worker, or of any association of producers, or growers, or workers, or of any processor, of sugar beets or sugarcane, is hereby authorized to adjudicate any dispute as to any of the terms under which sugar beets or sugarcane are grown or are to be grown and/or marketed, and the sugar and byproducts thereof are to be marketed. The decision and any determination of the Secretary shall be final.

(4) Any person willfully violating any order or regulation of the Secretary of Agriculture issued under this section shall, upon conviction, be punished by a fine of not more than \$100.

(5) Any person willfully exceeding any quota or allotment fixed for him under this title by the Secretary of Agriculture, and any other person knowingly participating, or aiding, in the exceeding of said quota or allotment, shall forfeit to the United States a sum equal to three times the current market value of such excess, which forfeiture shall be recoverable in a civil suit brought in the name of the United States.

(6) The several district courts of the United States are hereby vested with jurisdiction specifically to enforce, and to prevent and restrain any person from violating, the provisions of this section, or of any order, regulation, agreement, or license heretofore or hereafter made or issued pursuant to this title, in any proceeding now pending or hereafter brought in said court.

(7) Upon the request of the Secretary of Agriculture, it shall be the duty of the several district attorneys of the United States, in their respective districts, under the directions of the Attorney General, to institute proceedings to enforce the remedies and to collect the forfeitures provided for in, or pursuant to, this title.

(8) The remedies provided for in this section shall be in addition to, and not exclusive of, any of the remedies or penalties provided for elsewhere in this title or now or hereafter existing at law or in equity.

(9) The term "person" as used in this title includes an individual, partnership, corporation, association, and any other business unit.

SEC. 8a added by sec. 4 of the Jones-Costigan Sugar Act, Public no. 213, 73d Congress, approved May 9, 1934.

PROCESSING TAX

SEC. 9 (a) To obtain revenue for extraordinary expenses incurred by reason of the national economic emergency, there shall be levied processing taxes as hereinafter provided. When the Secretary of Agriculture determines that rental or benefit payments are to be made with respect to any basic agricultural commodity, he shall proclaim such determination, and a processing tax shall be in effect with respect to such commodity from the beginning of the marketing year therefor next following the date of such proclamation; *except that, in the case of sugar beets and sugarcane, the Secretary of Agriculture shall, on or before the thirtieth day after the adoption of this amendment, proclaim that rental or benefit payments with respect to said commodities are to be made, and the processing tax shall be in effect on and after the thirtieth day after the date of the adoption of this amendment. In the case of sugar beets and sugarcane, the calendar year shall be considered to be the marketing year and for the year 1934 the marketing year shall begin January 1, 1934.* The processing tax shall be levied, assessed, and collected upon the first domestic processing of the commodity, whether of domestic production or imported, and shall be paid by the processor. The rate of tax shall conform to the requirements of subsection (b). Such rate shall be determined by the Secretary of Agriculture as of the date the tax first takes effect, and the rate so determined shall, at such intervals as the Secretary finds necessary to effectuate the declared policy, be adjusted by him to conform to such requirements. The processing tax shall terminate at the end of the marketing year current at the time the Secretary proclaims that rental or benefit payments are to be discontinued with respect to such commodity. The marketing year for each commodity shall be ascertained and prescribed by regulations of the Secretary of Agriculture: *Provided, That upon any article upon which a manufacturers' sales tax is levied under the authority of the Revenue Act of 1932³ and which manufacturers' sales tax is computed on the basis of weight, such manufacturers' sales tax shall be computed on the basis of the weight of said finished article less the weight of the processed cotton contained therein on which a processing tax has been paid.*

As amended by sec. 9 of the Jones-Costigan Sugar Act, Public No. 213, 73d Congress, approved May 9, 1934.

(b) The processing tax shall be at such rate as equals the difference between the current average farm price for the commodity and the fair exchange value of the commodity; except that if the Secretary has reason to believe that the tax at such rate on the processing of the commodity generally or for any particular use or uses will cause such reduction in the quantity of the commodity or products thereof domestically consumed as to result in the accumulation of surplus stocks of the commodity or products thereof or in the depression of the farm price of the commodity, then he shall cause an appropriate investigation to be made and afford due notice and opportunity for hearing to interested parties.

³ Revenue Act of 1932, 47 Stat. 259; 26 U. S. C. 1481 note.

If thereupon the Secretary finds that *any* such result will occur, then the processing tax on the processing of the commodity generally, or for any designated use or uses, or as to any designated product or products thereof for any designated use or uses, shall be at such rate as will prevent such accumulation of surplus stocks and depression of the farm price of the commodity. In computing the current average farm price in the case of wheat, premiums paid producers for protein content shall not be taken into account. In the case of sugar beets or sugarcane the rate of tax shall be applied to the direct-consumption sugar, resulting from the first domestic processing, translated into terms of pounds of raw value according to regulations to be issued by the Secretary of Agriculture, and the rate of tax to be so applied shall be the higher of the two following quotients: The difference between the current average farm price and the fair exchange value (1) of a ton of sugar beets and (2) of a ton of sugarcane, divided in the case of each commodity by the average extraction therefrom of sugar in terms of pounds of raw value (which average extraction shall be determined from available statistics of the Department of Agriculture); except that such rate shall not exceed the amount of the reduction by the President on a pound of sugar raw value of the rate of duty in effect on January 1, 1934, under paragraph 501 of the Tariff Act of 1930, as adjusted to the treaty of commercial reciprocity concluded between the United States and the Republic of Cuba on December 11, 1902, and/or the provisions of the Act of December 17, 1903, chapter 1.

As amended by sec. 3 of the Jones-Costigan Sugar Act, Public, No. 213, 73d Congress, approved May 9, 1934.

Section 3 (a) of that Act amends the first two sentences as shown above in italics; section 3 (b) of that Act inserts the new matter shown in italics in the last sentence above.

(c) For the purposes of part 2 of this title, the fair exchange value of a commodity shall be the price therefor that will give the commodity the same purchasing power, with respect to articles farmers buy, as such commodity had during the base period specified in section 2; and the current average farm price and the fair exchange value shall be ascertained by the Secretary of Agriculture from available statistics of the Department of Agriculture.

(d) As used in part 2 of this title—

(1) In case of wheat, rice, and corn, the term "processing" means the milling or other processing (except cleaning and drying) of wheat, rice, or corn for market, including custom milling for toll as well as commercial milling, but shall not include the grinding or cracking thereof not in the form of flour for feed purposes only.

(2) In case of cotton, the term "processing" means the spinning, manufacturing, or other processing (except ginning) of cotton; and the term "cotton" shall not include cotton linters.

(3) In case of tobacco, the term "processing" means the manufacturing or other processing (except drying or converting into insecticides and fertilizers) of tobacco.

(5) ⁴ In case of peanuts, the term "processing" means the cleaning, polishing, grading, shelling, crushing, or other processing thereof.

This paragraph was added by sec. 3 (a) of the Jones-Connally Cattle Act, Public, No. 142, 73d Congress approved April 7, 1934.

(6) In the case of sugar beets and sugarcane—

(A) The term "first domestic processing" means each domestic processing, including each processing of successive domestic processings, of sugar beets, sugarcane, or raw sugar, which directly results in direct-consumption sugar.

(B) The term "sugar" means sugar in any form whatsoever, derived from sugar beets or sugarcane, whether raw sugar or direct-consumption sugar, including also edible molasses, sirups and any mixture containing sugar (except blackstrap molasses and beet molasses).

(C) The term "blackstrap molasses" means the commercially so-designated "byproduct" of the cane-sugar industry, not used for human consumption or for the extraction of sugar.

(D) The term "beet molasses" means the commercially so-designated "byproduct" of the beet-sugar industry, not used for human consumption or for the extraction of sugar.

(E) The term "raw sugar" means any sugar, as defined above, manufactured or marketed in, or brought into, the United States, in any form whatsoever, for the purpose of being, or which shall be, further refined (or improved in quality, or further prepared for distribution or use).

⁴ Paragraph (4) of Sec. 9 (d) of the original Act was repealed by sec. 2 (a) of the Flannagan Amendment, Public, No. 476, 73d Congress, approved June 26, 1934. It read as follows:

"(4) In case of hogs, the term 'processing' means the slaughter of hogs for market."

(F) The term "direct-consumption sugar" means any sugar, as defined above, manufactured or marketed in, or brought into, the United States in any form whatsoever, for any purpose other than to be further refined (or improved in quality, or further prepared for distribution or use).

(G) The term "raw value" means a standard unit of sugar testing ninety-six sugar degrees by the polariscope. All taxes shall be imposed and all quotas shall be established in terms of "raw value" and for purposes of quota and tax measurements all sugar shall be translated into terms of "raw value" according to regulations to be issued by the Secretary, except that in the case of direct-consumption sugar produced in continental United States from sugar beets the raw value of such sugar shall be one and seven one-hundredths times the weight thereof.

Paragraph 6 added by sec. 2 of the Jones-Costigan Sugar Act, Public, No. 213, 73d Congress, approved May 9, 1934.

(7) ⁵ In the case of any other commodity, the term "processing" means any manufacturing or other processing involving a change in the form of the commodity or its preparation for *distribution or use*, as defined by regulations of the Secretary of Agriculture; and in prescribing such regulations the Secretary shall give due weight to the customs of the industry.

As amended by sec. 2 (b) of the Flannagan Amendment, Public, No. 476, 73d Congress, approved June 26, 1934.

A comparative print of this paragraph prior to and after its amendment is as follows:

[(5)] (7) In the case of any other commodity, the term "processing" means any manufacturing or other processing involving a change in the form of the commodity or its preparation for [market] *distribution or use*, as defined by regulations of the Secretary of Agriculture; and in prescribing such regulations the Secretary shall give due weight to the customs of the industry.

(e) When any processing tax, or increase or decrease therein, takes effect in respect of a commodity the Secretary of Agriculture, in order to prevent pyramiding of the processing tax and profiteering in the sale of the products derived from the commodity, shall make public such information as he deems necessary regarding (1) the relationship between the processing tax and the price paid to producers of the commodity, (2) the effect of the processing tax upon prices to consumers of products of the commodity, (3) the relationship, in previous periods, between prices paid to the producers of the commodity and prices to consumers of the products thereof, and (4) the situation in foreign countries relating to prices paid to producers of the commodity and prices to consumers of the products thereof.

(f) *For the purposes of part 2 of this title, processing shall be held to include manufacturing.*

Subsection (f) added by sec. 6 of the Jones-Costigan Sugar Act, Public, No. 213, 73d Congress, approved May 9, 1934.

MISCELLANEOUS

SEC. 10. (a) The Secretary of Agriculture may appoint such officers and employees, subject to the provisions of the Classification Act of 1923 ⁶ and Acts amendatory thereof,⁷ and such experts as are necessary to execute the functions vested in him by this title; and the Secretary may make such appointments without regard to the civil service laws or regulations: *Provided*, That no salary in excess of \$10,000 per annum shall be paid to any officer, employee, or expert of the Agricultural Adjustment Administration, which the Secretary shall establish in the Department of Agriculture for the administration of the functions vested in him by this title: *And provided further*, That the State Administrator appointed to administer this Act in each State shall be appointed by the President, by and with the advice and consent of the Senate. Title II of the Act entitled "An Act to maintain the credit of the United States Government",⁸ approved March 20, 1933, to the extent that it provides for the impoundment of appropriations on account of reductions in compensation, shall not operate to require such impoundment under appropriations contained in this Act.

As amended by sec. 86 of the Farm Credit Act of 1933, 48 Stat. 273, 7 U.S.C. § 610.

(b) The Secretary of Agriculture is authorized to establish, for the more effective administration of the functions vested in him by this title, State and local committees, or associations of producers, and to permit cooperative associations of producers, when in his judgment they are qualified to do so, to act as

⁵ This paragraph was numbered (5) in the original Act, and was renumbered by sec. 3 (a) of the Jones-Connally Cattle Act, Public, No. 142, 73d Congress, approved April 7, 1934, and by sec. 5 of the Jones-Costigan Sugar Act, Public, No. 213, 73d Congress, approved May 9, 1934.

⁶ 42 Stat. 1488, 5 U.S.C. § 661 et seq.

⁷ 43 Stat. 669; 45 Stat. 193, 776, 785; 46 Stat. 1003, 1005; 5 U.S.C. § 673 et passim.

⁸ "An Act to maintain the credit of the United States Government." 48 Stat. 12, (1933); 5 U.S.C. 673, note.

agents of their members and patrons in connection with the distribution of rental or benefit payments.

(c) The Secretary of Agriculture is authorized, with the approval of the President, to make such regulations with the force and effect of law as may be necessary to carry out the powers vested in him by this title, including regulations establishing conversion factors for any commodity and article processed therefrom to determine the amount of tax imposed or refunds to be made with respect thereto. Any violation of any regulation shall be subject to such penalty, not in excess of \$100, as may be provided therein.

(d) The Secretary of the Treasury is authorized to make such regulations as may be necessary to carry out the powers vested in him by this title.

(e) The action of any officer, employee, or agent in determining the amount of and in making any rental or benefit payment shall not be subject to review by any officer of the Government other than the Secretary of Agriculture or Secretary of the Treasury.

(f) The provisions of this title shall be applicable to the United States and its possessions, except the Philippine Islands, the Virgin Islands, American Samoa, the Canal Zone, and the island of Guam; *except that, in the case of sugar beets and sugarcane, the President, if he finds it necessary in order to effectuate the declared policy of this Act, is authorized by proclamation to make the provisions of this title applicable to the Philippine Islands, the Virgin Islands, American Samoa, the Canal Zone, and/or the island of Guam.*

As amended by sec. 7 of the Jones-Costigan Sugar Act, Public No. 213, 73d Congress, approved May 9, 1934.

(g) No person shall, while acting in any official capacity in the administration of this title, speculate, directly or indirectly, in any agricultural commodity or product thereof, to which this title applies, or in contracts relating thereto, or in the stock or membership interests of any association or corporation engaged in handling, processing, or disposing of any such commodity or product. Any person violating this subsection shall upon conviction thereof be fined not more than \$10,000 or imprisoned not more than two years, or both.

(h) For the efficient administration of the provisions of part 2 of this title, the provisions, including penalties, of sections 8, 9, and 10 of the Federal Trade Commission Act, approved September 26, 1914, are made applicable to the jurisdiction, powers, and duties of the Secretary in administering the provisions of this title and to any person subject to the provisions of this title, whether or not a corporation. Hearings authorized or required under this title shall be conducted by the Secretary of Agriculture or such officer or employee of the Department as he may designate for the purpose. The Secretary may report any violation of any agreement entered into under part 2 of this title to the Attorney General of the United States, who shall cause appropriate proceedings to enforce such agreements to be commenced and prosecuted in the proper courts of the United States without delay.

COMMODITIES

Sec. 11. As used in this title, the term "basic agricultural commodity" means wheat, rye, flax, barley, cotton, field corn, grain sorghums, hogs, cattle, rice, tobacco, sugar beets and sugarcane, peanuts, and milk and its products, and any regional or market classification, type, or grade thereof; but the Secretary of Agriculture shall exclude from the operation of the provisions of this title, during any period, any such commodity or classification, type, or grade thereof if he finds, upon investigation at any time and after due notice and opportunity for hearing to interested parties, that the conditions of production, marketing, and consumption are such that during such period this title cannot be effectively administered to the end of effectuating the declared policy with respect to such commodity or classification, type, or grade thereof.

As amended by sec. 1 of the Jones-Costigan Sugar Act, Public, No. 213, 73d Congress, approved May 9, 1934, which added the words: "sugar beets and sugarcane"; and by the Jones-Connally Cattle Act, Public, No. 142, 73d Congress, approved April 7, 1934. Sec. 1 of that Act added the word "cattle"; sec. 3 (b) the word "peanuts"; sec. 4 the words "rye, flax, and barley"; sec. 5 the words "grain sorghums."

APPROPRIATION ⁹

Sec. 12. (a) There is hereby appropriated, out of any money in the Treasury not otherwise appropriated, the sum of \$100,000,000 to be available to the Secre-

⁹ For authorization of allocation of \$100,000,000 by sec. 220 of the National Industrial Recovery Act, see p. 329.

For appropriation of an additional \$150,000,000 made by Public Resolution No. 27, see p. 330.

For availability of proceeds of tax provided for by sec. 16 (c) of Bankhead Cotton Act, see p. 336.

For appropriation of \$525,000,000 for emergency relief contained in Title II of Emergency Appropriation Act, fiscal year 1935, see p. 336.

tary of Agriculture for administrative expenses under this title and for rental and benefit payments made with respect to reduction in acreage or reduction in production for market under part 2 of this title. Such sum shall remain available until expended.

To enable the Secretary of Agriculture to finance, under such terms and conditions as he may prescribe, surplus reductions and production adjustments with respect to the dairy- and beef-cattle industries, and to carry out any of the purposes described in subsections (a) and (b) of this section (12) and to support and balance the markets for the dairy and beef cattle industries, there is authorized to be appropriated, out of any money in the Treasury not otherwise appropriated, the sum of \$200,000,000: Provided, That not more than 60 per centum of such amount shall be used for either of such industries.

As amended by sec. 2 of the Jones-Connally Cattle Act, Public, No. 142, 73d Congress, approved April 7, 1934.

(b) In addition to the foregoing, the proceeds derived from all taxes imposed under this title are hereby appropriated to be available to the Secretary of Agriculture for expansion of markets and removal of surplus agricultural products and the following purposes under part 2 of this title: Administrative expenses, rental and benefit payments, and refunds on taxes. The Secretary of Agriculture and the Secretary of the Treasury shall jointly estimate from time to time the amounts, in addition to any money available under subsection (a), currently required for such purposes; and the Secretary of the Treasury shall, out of any money in the Treasury not otherwise appropriated, advance to the Secretary of Agriculture the amounts so estimated. The amount of any such advance shall be deducted from such tax proceeds as shall subsequently become available under this subsection.

(c) The administrative expenses provided for under this section shall include, among others, expenditures for personal services and rent in the District of Columbia and elsewhere, for law books and books of reference, for contract stenographic reporting services, and for printing and paper in addition to allotments under the existing law. The Secretary of Agriculture shall transfer to the Treasury Department, and is authorized to transfer to other agencies, out of funds available for administrative expenses under this title, such sums as are required to pay administrative expenses incurred and refunds made by such department or agencies in the administration of this title.

TERMINATION OF ACT

SEC. 13. This title shall cease to be in effect whenever the President finds and proclaims that the national economic emergency in relation to agriculture has been ended; and pending such time the President shall by proclamation terminate with respect to any basic agricultural commodity such provisions of this title as he finds are not requisite to carrying out the declared policy with respect to such commodity. *In the case of sugar beets and sugarcane, the taxes provided by this title shall cease to be in effect, and the powers vested in the President or in the Secretary of Agriculture shall terminate at the end of three years after the adoption of this amendment unless this title ceases to be in effect at an earlier date, as hereinabove provided.* The Secretary of Agriculture shall make such investigations and reports thereon to the President as may be necessary to aid him in executing this section.

As amended by sec. 15 of the Jones-Costigan Act, Public, No. 213, 73d Congress, approved May 9, 1934.

SEPARABILITY OF PROVISIONS

SEC. 14. If any provision of this title is declared unconstitutional, or the applicability thereof to any person, circumstance, or commodity is held invalid the validity of the remainder of this title and the applicability thereof to other persons, circumstances, or commodities shall not be affected thereby.

SUPPLEMENTARY REVENUE PROVISIONS

EXEMPTIONS AND COMPENSATING TAXES

SEC. 15. (a) *If at any time the Secretary of Agriculture finds, upon investigation and after due notice and opportunity for hearing to interested parties, that any class of products of any commodity is of such low value, considering the quantity of the commodity used for their manufacture, that the imposition of the processing tax would prevent in whole or in large part the use of the commodity*

in the manufacture of such products and thereby substantially reduce consumption and increase the surplus of the commodity, then the Secretary of Agriculture shall so certify to the Secretary of the Treasury, *specifying whether such result will in his judgment most effectively be prevented by a suspension of the imposition of the processing tax or a refund of the tax paid, with respect to such amount of the commodity or any product thereof as is used in the manufacture of such products, and thereafter, as shall be specified in such certification, (1) the imposition of the processing tax shall be suspended with respect to such amount of the commodity as is used in the manufacture of such products, and thereafter, as shall be specified in such certification, (2) the imposition of the processing tax shall be suspended with respect to such amount of the commodity as is used in the manufacture of such products*¹⁰ until such time as the Secretary of Agriculture, after further investigation and due notice and opportunity for hearing to interested parties, revokes his certification to the Secretary of the Treasury, or (3) the Secretary of the Treasury shall refund (in accordance with the provisions of, to such persons and in such manner as shall be specified in, such certification) the amount of any tax paid (prior to the date of any revocation by the Secretary of Agriculture of his certification to the Secretary of the Treasury, upon further investigation and after due notice and opportunity for hearing to interested parties) under this title with respect to such amount of the commodity or any product thereof as is used after the date of such certification in the manufacture of such products.

As amended by sec. II of the Flannagan Amendment, Public No. 476, 73d Congress, approved June 26, 1934.

A comparative print of subsection 15(a) prior to and after its amendment is as follows:

SEC. 15. (a) If at any time the Secretary of Agriculture finds, upon investigation [at any time] and after due notice and opportunity for hearing to interested parties, that any class of products of any commodity is of such low value [compared with], considering the quantity of the commodity used for their manufacture, that the imposition of the processing tax would prevent in whole or in large part the use of the commodity in the manufacture of such products and thereby substantially reduce consumption and increase the surplus of the commodity, then the Secretary of Agriculture shall so certify to the Secretary of the Treasury, *specifying whether such result will in his judgment most effectively be prevented by a suspension of the imposition of the processing tax or a refund of the tax paid, with respect to such amount of the commodity or any product thereof as is used in the manufacture of such products, and thereafter, as shall be specified in such certification, (1) the imposition of the processing tax shall be suspended with respect to such amount of the commodity as is used in the manufacture of such products, and thereafter, as shall be specified in such certification, (2) the imposition of the processing tax shall be suspended with respect to such amount of the commodity as is used in the manufacture of such products until such time as the Secretary of Agriculture, after further investigation and due notice and opportunity for hearing to interested parties, revokes his certification to the Secretary of the Treasury, or (3) [and] the Secretary of the Treasury shall [abate or] refund (in accordance with the provisions of, to such persons and in such manner as shall be specified in, such certification) the amount of any [processing] tax [assessed or] paid [after the date of such certification] (prior to the date of any revocation by the Secretary of Agriculture of his certification to the Secretary of the Treasury, upon further investigation and after due notice and opportunity for hearing to interested parties) under this title with respect to such amount of the commodity or any product thereof as is used after the date of such certification in the manufacture of such products.*

(b) No tax shall be required to be paid on the processing of any commodity by or for the producer thereof for consumption by his own family, employees, or household; and the Secretary of Agriculture is authorized, by regulations, to exempt from the payment of the processing tax the processing of commodities by or for the producer thereof for sale by him where, in the judgment of the Secretary, the imposition of a processing tax with respect thereto is unnecessary to effectuate the declared policy.

(c) Any person, including any State or Federal organization or institution, delivering any product to any organization for charitable distribution, or use, including any State or Federal welfare organization, for its own use, whether the product is delivered as merchandise, or as a container for merchandise, or otherwise, shall, if such product or the commodity from which processed is under this title subject to tax, be entitled to a refund of the amount of any tax due and paid under this title with respect to such product so delivered, or to a credit against any tax due and payable under this title of the amount of tax which would be refundable under this section with respect to such product so delivered: Provided, however, That no tax shall be refunded or credited under this section, unless the person claiming the refund or credit establishes, in accordance with regulations prescribed by the Commissioner of Internal Revenue, with the approval of the Secretary of the Treasury (1) that he has not included the tax in the price of the product so delivered or collected the amount of the tax from the said organization, or (2) that he has repaid, or has agreed in writing to repay, the amount of the tax to the said organization. No refund shall be allowed under this section unless claim therefor is filed within six months after delivery of the products to the organization for charitable distribution, or use. The word "State" as used in this section shall include a State and any political subdivision thereof.

As amended by the Dieterich Amendment, Public, No. 367, 73d Congress, approved June 16, 1934.

¹⁰ So in original.

(d) The Secretary of Agriculture shall ascertain from time to time whether the payment of the processing tax upon any basic agricultural commodity is causing or will cause to the processors thereof disadvantages in competition from competing commodities by reason of excessive shifts in consumption between such commodities or products thereof. If the Secretary of Agriculture finds, after investigation and due notice and opportunity for hearing to interested parties, that such disadvantages in competition exist, or will exist, he shall proclaim such finding. The Secretary shall specify in this proclamation the competing commodity and the compensating rate of tax on the processing thereof necessary to prevent such disadvantages in competition. Thereafter there shall be levied, assessed, and collected upon the first domestic processing of such competing commodity a tax, to be paid by the processor, at the rate specified, until such rate is altered pursuant to a further finding under this section, or the tax or rate thereof on the basic agricultural commodity is altered or terminated. In no case shall the tax imposed upon such competing commodity exceed that imposed per equivalent unit, as determined by the Secretary, upon the basic agricultural commodity.

(e) During any period for which a processing tax is in effect with respect to any commodity there shall be levied, assessed, collected, and paid upon any article processed or manufactured wholly or *partly* from such commodity and imported into the United States or any possession thereof to which this title applies, from any foreign country or from any possession of the United States to which this title does not apply, *whether imported as merchandise, or as a container of merchandise, or otherwise*, a compensating tax equal to the amount of the processing tax in effect with respect to domestic processing of such commodity at the time of importation: *Provided*, That all taxes collected under this subsection upon articles coming from the possessions of the United States to which this title does not apply shall not be covered into the general fund of the Treasury of the United States but shall be held as a separate fund and paid into the Treasury of the said possessions, respectively, to be used and expended by the governments thereof for the benefit of agriculture. Such tax shall be paid prior to the release of the article from customs custody or control.

As amended by sec. 11 of the Jones-Costigan Sugar Act, Public, No. 213, 73d Congress, approved May 9, 1934.

A comparative print of subsection 15 (e) prior to and after its amendment is as follows:

Sec. 15. (e) During any period for which a processing tax is in effect with respect to any commodity there shall be levied, assessed, collected, and paid upon any article processed or manufactured wholly or *[in chief value]* *partly* from such commodity and imported into the United States or any possession thereof to which this title applies, from any foreign country or from any possession of the United States to which this title does not apply, *whether imported as merchandise, or as a container of merchandise, or otherwise*, a compensating tax equal to the amount of the processing tax in effect with respect to domestic processing of such commodity at the time of importation: *Provided*, That all taxes collected under this subsection upon articles coming from the possessions of the United States to which this title does not apply shall not be covered into the general fund of the Treasury of the United States but shall be held as a separate fund and paid into the Treasury of the said possessions, respectively, to be used and expended by the governments thereof for the benefit of agriculture. Such tax shall be paid prior to the release of the article from customs custody or control.

(f) *The President, in his discretion, is authorized by proclamation to decree that all or part of the taxes collected from the processing of sugar beets or sugarcane in Puerto Rico, the Territory of Hawaii, the Philippine Islands, the Virgin Islands, American Samoa, the Canal Zone, and/or the island of Guam (if the provisions of this title are made applicable thereto), and/or upon the processing in continental United States of sugar produced in, or coming from, said areas, shall not be covered into the general fund of the Treasury of the United States but shall be held as a separate fund, in the name of the respective area to which related, to be used and expended for the benefit of agriculture and/or paid as rental or benefit payments in connection with the reduction in the acreage, or reduction in the production for market, or both, of sugar beets and/or sugarcane, and/or used and expended for expansion of markets and for removal of surplus agricultural products in such areas, respectively, as the Secretary of Agriculture, with the approval of the President, shall direct.*

Subsection (f) added by sec. 8 of the Jones-Costigan Sugar Act, Public, No. 213, 73d Congress, approved May 9, 1934.

FLOOR STOCKS

SEC. 16.¹¹ (a) Upon the sale or other disposition of any article processed wholly or in chief value from any commodity with respect to which a processing tax is to be levied, that on the date the tax first takes effect or wholly terminates

¹¹ The provisions of sec. 16 do not apply, in certain situations, to machinery belting processed from cotton. See Public, No. 470, 73d Congress, approved June 26, 1934. For text, see p. 329.

with respect to the commodity, is held for sale or other disposition (including articles in transit) by any person, there shall be made a tax adjustment as follows:

(1) Whenever the processing tax first takes effect, there shall be levied, assessed, and collected a tax to be paid by such person equivalent to the amount of the processing tax which would be payable with respect to the commodity from which processed if the processing had occurred on such date. *Such tax upon articles imported prior to, but in customs custody or control on, the effective date, shall be paid prior to release therefrom. In the case of sugar, the tax on floor stocks, except the retail stocks of persons engaged in retail trade, shall be paid for the month in which the stocks are sold, or used in the manufacture of other articles, under rules and regulations prescribed by the Commissioner of Internal Revenue with the approval of the Secretary of the Treasury.*

As amended by sec. 10 of the Jones-Costigan Sugar Act, Public, No. 213, 73d Congress, approved May 9, 1934.

(2) Whenever the processing tax is wholly terminated, there shall be refunded to such person a sum (or if it has not been paid, the tax shall be abated) in an amount equivalent to the processing tax with respect to the commodity from which processed.

(b) The tax imposed by subsection (a) shall not apply to the retail stocks of persons engaged in retail trade, held at the date the processing tax first takes effect; but such retail stocks shall not be deemed to include stocks held in a warehouse on such date, or such portion of other stocks held on such date as are not sold or otherwise disposed of within thirty days thereafter. The tax refund or abatement provided in subsection (a) shall not apply to the retail stocks of persons engaged in retail trade, held on the date the processing tax is wholly terminated.

(c) (1) *Any sugar, imported prior to the effective date of a processing tax on sugar beets and sugarcane, with respect to which it is established (under regulations prescribed by the Commissioner of Internal Revenue, with the approval of the Secretary of the Treasury) that there was paid at the time of importation a duty at the rate in effect on January 1, 1934, and (2) any sugar held on April 25, 1934, by, or to be delivered under a bona fide contract of sale entered into prior to April 25, 1934, to, any manufacturer or converter, for use in the production of any article (except sugar) and not for ultimate consumption as sugar, and (3) any article (except sugar) processed wholly or in chief value from sugar beets, sugarcane, or any product thereof, shall be exempt from taxation under subsection (a) of this section, but sugar held in customs custody or control on April 25, 1934, shall not be exempt from taxation under subsection (a) of this section, unless the rate of duty paid upon the withdrawal thereof was the rate of duty in effect on January 1, 1934. The provisions of paragraph (2) of subsection (a) of this section shall not apply in the case of sugar beets or sugarcane or the products thereof.*

Sec. 16 (c) was added by sec. 17 of the Jones-Costigan Sugar Act, Public, No. 213, 73d Congress, approved May 9, 1934.

(d) *The Secretary of Agriculture is authorized to purchase, out of such proceeds of taxes as are available therefor, during the period this Act is in effect with respect to sugar beets and sugarcane, not in excess of three hundred thousand tons of sugar raw value from the surplus stocks of direct-consumption sugar produced in the United States beet-sugar area, at a price not in excess of the market price for direct-consumption sugar on the date of purchase, and to dispose of such sugar by sale or otherwise, including distribution to any organization for the relief of the unemployed, under such conditions and at such times as will tend to effectuate the declared policy of section 8a of this Act. The sugar so purchased shall not be included in the quota for the United States beet-sugar area. All proceeds received by the Secretary of Agriculture, in the exercise of the powers granted hereby, are appropriated to be available to the Secretary of Agriculture for the purposes described in subsections (a) and (b) of section 12 of this Act.*

As amended by sec. 17 of the Jones-Costigan Sugar Act, Public, No. 213, 73d Congress, approved May 9, 1934.

(C) ¹² *Upon the sale or other disposition of any article processed wholly or in chief value from any commodity with respect to which the existing rate of the processing tax is to be increased, or decreased, that on the date such increase, or decrease, first takes effect with respect to the commodity, is held for sale or other disposition (including articles in transit) by any person, and upon the production of any article from a commodity in process on the date on which the rate of the processing tax is to be increased or decreased, there shall be made a tax adjustment as follows:*

¹² So in original. Subsection (C) should have been lettered "(e)".

(1) Whenever the rate of the processing tax on the processing of the commodity generally or for any designated use or uses, or as to any designated product or products thereof for any designated use or uses, or as to any class of products, is decreased, there shall be credited or refunded to such person an amount equivalent to the difference between the rate of the processing tax payable or paid at the time immediately preceding the decrease in rate and the rate of the processing tax which would have been payable with respect to the commodity from which processed, if the processing had occurred on such date: Provided, however, That no such credit or refund shall be made unless the rate of the processing tax immediately preceding said decrease is equal to, or less than, the rate of the processing tax in effect on the date on which any floor stocks tax was paid prior to the adoption of this amendment.

(2) Whenever the rate of the processing tax on the processing of the commodity generally, or for any designated use or uses, or as to any designated product or products thereof for any designated use or uses, or as to any class of products, is increased, there shall be levied, assessed and collected a tax to be paid by such person equivalent to the difference between the rate of the processing tax payable or paid at the time immediately preceding the increase in rate and the rate of the processing tax which would be payable with respect to the commodity from which processed, if the processing had occurred on such date.

(3) Whenever the processing tax is suspended or is to be refunded pursuant to a certification of the Secretary of Agriculture to the Secretary of the Treasury, under section 15 (a) of this Act, the provisions of subdivision (1) of subsection (c) of this section shall become applicable.

(4) Whenever the Secretary of Agriculture revokes any certification to the Secretary of the Treasury under section 15 (a) of this Act, the provisions of subdivision (2) of subsection (c) shall become applicable.

(5) The provisions of this amendment shall be effective on and after June 1, 1934,

Subsection 16 (C) was added by sec. 1 of the Flannagan Amendment, Public, No. 476, 73d Congress, approved June 26, 1934.

EXPORTATIONS

SEC. 17. (a) Upon the exportation to any foreign country (and/or to the Philippine Islands, the Virgin Islands, American Samoa, the Canal Zone, and the island of Guam) of any product with respect to which a tax has been paid under this title, or of any product processed wholly or partly from a commodity with respect to which product or commodity a tax has been paid under this title, the tax due and paid shall be refunded. The refund shall be paid to the exporter or to the consignor named in the bill of lading under which the product is exported, as determined under regulations prescribed by the Commissioner of Internal Revenue, with the approval of the Secretary of the Treasury. In the case of sugar beets and sugar-cane, this subsection shall be applicable to exports of products thereof to the Philippine Islands, the Virgin Islands, American Samoa, the Canal Zone, and/or the island of Guam only if this title with respect to sugar beets and sugarcane is not made applicable thereto. The term "product" includes any product exported as merchandise, or as a container for merchandise, or otherwise.

As amended by sec. 12 of the Jones-Costigan Sugar Act, Public No. 213, 73d Congress, approved May 9, 1934. This amendment is effective as of the date of the enactment of the Agricultural Adjustment Act. A comparative print of subsection 17 (a) prior to and after its amendment is as follows:

SEC. 17. (a) Upon the exportation to any foreign country ~~including~~ and/or to the Philippine Islands, the Virgin Islands, American Samoa, the Canal Zone, and the island of Guam) of any product with respect to which a tax has been paid under this title, or of any product processed wholly or ~~in chief value~~ partly from a commodity with respect to which product or commodity a tax has been paid under this title, ~~the~~ exporter thereof shall be entitled at the time of exportation to a refund of the amount of such tax ~~the tax due and paid shall be refunded.~~ The refund shall be paid to the exporter or to the consignor named in the bill of lading under which the product is exported, as determined under regulations prescribed by the Commissioner of Internal Revenue, with the approval of the Secretary of the Treasury. In the case of sugar beets and sugarcane, this subsection shall be applicable to exports of products thereof to the Philippine Islands, the Virgin Islands, American Samoa, the Canal Zone, and/or the island of Guam only if this title with respect to sugar beets and sugarcane is not made applicable thereto. The term "product" includes any product exported as merchandise, or as a container for merchandise, or otherwise.

(b) Upon the giving of bond satisfactory to the Secretary of the Treasury for the faithful observance of the provisions of this title requiring the payment of taxes, any person shall be entitled, without payment of the tax, to process for such exportation any commodity with respect to which a tax is imposed by this title, or to hold for such exportation any article processed wholly or partly therefrom.

As amended by sec. 13 of the Jones-Costigan Sugar Act, Public, No. 213, 73d Congress, approved May 9, 1934. The amendment strikes out "in chief value" and inserts in lieu thereof "partly."

EXISTING CONTRACTS

SEC. 18. (a) If (1) any processor, jobber, or wholesaler has, prior to the date a tax with respect to any commodity is first imposed under this title, made a bona

fide contract of sale for delivery on or after such date, of any article processed wholly or in chief value from such commodity, and if (2) such contract does not permit the addition to the amount to be paid thereunder of the whole of such tax, then (unless the contract prohibits such addition) the vendee shall pay so much of the tax as is not permitted to be added to the contract price.

(b) Taxes payable by the vendee shall be paid to the vendor at the time the sale is consummated and shall be collected and paid to the United States by the vendor in the same manner as other taxes under this title. In case of failure or refusal by the vendee to pay such taxes to the vendor, the vendor shall report the facts to the Commissioner of Internal Revenue who shall cause collections of such taxes to be made from the vendee.

COLLECTION OF TAXES

SEC. 19. (a) The taxes provided in this title shall be collected by the Bureau of Internal Revenue under the direction of the Secretary of the Treasury. Such taxes shall be paid into the Treasury of the United States.

(b) All provisions of law, including penalties, applicable with respect to the taxes imposed by section 600 of the Revenue Act of 1926,¹³ and the provisions of section 626 of the Revenue Act of 1932, shall, in so far as applicable and not inconsistent with the provisions of this title, be applicable in respect of taxes imposed by this title: *Provided*, That the Secretary of the Treasury is authorized to permit postponement, for a period not exceeding *one hundred and eighty days*, of the payment of taxes covered by any return under this title.

As amended by sec. 3 of Flannagan Amendment, Public, No. 476, 73d Congress, approved June 26, 1934. The amendment substituted "one hundred and eighty" for "ninety."

(c) In order that the payment of taxes under this title may not impose any immediate undue financial burden upon processors or distributors, any processor or distributor subject to such taxes shall be eligible for loans from the Reconstruction Finance Corporation under section 5 of the Reconstruction Finance Corporation Act.

SEC. 20. (a) *Whoever in connection with the purchase of, or offer to purchase, any commodity, subject to any tax under this title, or which is to be subjected to any tax under this title, makes any statement, written or oral, (1) intended or calculated to lead any person to believe that any amount deducted from the market price or the agreed price of the commodity consists of a tax imposed under this title, or (2) ascribing a particular part of the deduction from the market price or the agreed price of the commodity, to a tax imposed under this title, knowing that such statement is false or that the tax is not so great as the amount deducted from the market price or the agreed price of the commodity, ascribed to such tax, shall be guilty of a misdemeanor and, upon conviction thereof, shall be punished by a fine of not more than \$1,000 or by imprisonment for not exceeding six months, or both.*

(b) *Whoever in connection with the processing of any commodity subject to any tax under this title, whether commercially, for toll, upon an exchange, or otherwise, makes any statement, written or oral, (1) intended or calculated to lead any person to believe that any part of the charge for said processing, whether commercially, for toll, upon an exchange, or otherwise, consists of a tax imposed under this title, or (2) ascribing a particular part of the charge for processing, whether commercially, for toll, upon an exchange, or otherwise, to a tax imposed under this title, knowing that such statement is false, or that the tax is not so great as the amount charged for said processing ascribed to such tax, shall be guilty of a misdemeanor, and upon conviction thereof, shall be punished by a fine of not more than \$1,000 or by imprisonment for not exceeding six months, or both.*

(c) *Whoever in connection with any settlement, under a contract to buy any commodity, and/or to sell such commodity, or any product or byproduct thereof, subject to any tax under this title, makes any statement, written or oral, (1) intended or calculated to lead any person to believe that any amount deducted from the gross sales price, in arriving at the basis of settlement under the contract, consists of a tax under this title, or (2) ascribing a particular amount deducted from the gross sales price, in arriving at the basis of settlement under the contract, to a tax imposed under this title, knowing that such statement is false, or that the tax is not so great as the amount so deducted and/or ascribed to such tax, shall be guilty of a misdemeanor, and, upon conviction thereof, shall be punished by a fine of not more than \$1,000 or by imprisonment for not exceeding six months, or both.*

SEC. 20 added by sec. 16 of Jones-Costigan Sugar Act, Public No. 213, 73d Congress, approved May 9, 1934.

¹³ 44 Stat. 116. Certain penalties with respect to the taxes imposed by sec. 600 of the Revenue Act of 1926 are provided by sec. 1114 of that Act. Secs. 3176, as amended, and 3184 of the Revised Statutes, relating to returns and payment of taxes, are also applicable.

NATIONAL INDUSTRIAL RECOVERY ACT

48 Stat. 199; 15 U. S. C. § 708

(Extracts)

SEC. 8. (a) ¹⁴ This title shall not be construed to repeal or modify any of the provisions of title I of the Act entitled "An Act to relieve the existing national economic emergency by increasing agricultural purchasing power, to raise revenue for extraordinary expenses incurred by reason of such emergency, to provide emergency relief with respect to agricultural indebtedness, to provide for the orderly liquidation of joint-stock land banks, and for other purposes", approved May 12, 1933; and such title I of said Act approved May 12, 1933, may for all purposes be hereafter referred to as the "Agricultural Adjustment Act."

(b) The President may, in his discretion, in order to avoid conflicts in the administration of the Agricultural Adjustment Act and this title, delegate any of his functions and powers under this title with respect to trades, industries, or subdivisions thereof which are engaged in the handling of any agricultural commodity or product thereof, or of any competing commodity or product thereof, to the Secretary of Agriculture.

48 Stat. 210; 7 U. S. C. § 607

SEC. 221. Section 7 of the Agricultural Adjustment Act, approved May 12, 1933, is amended by striking out all of its present terms and provisions and substituting therefor the following:

"SEC. 7. The Secretary shall sell the cotton held by him at his discretion, but subject to the foregoing provisions: *Provided*, That he shall dispose of all cotton held by him by March 1, 1936: *Provided further*, That notwithstanding the provisions of section 6, the Secretary shall have authority to enter into option contracts with producers of cotton to sell to the producers such cotton held by him, in such amounts and at such prices and upon such terms and conditions as the Secretary may deem advisable, in combination with rental or benefit payments provided for in part 2 of this title.

"Notwithstanding any provisions of existing law, the Secretary of Agriculture may in the administration of the Agricultural Adjustment Act make public such information as he deems necessary in order to effectuate the purposes of such Act."

RELATED LEGISLATION

FLOOR STOCKS TAX, COTTON STOCKS MACHINERY BELTING

48 Stat. 1223; 7 U. S. C. § 621, 622

[PUBLIC—No. 470—73D CONGRESS]

[S. 3419]

AN ACT

To exempt articles of machinery belting from the tax on floor stocks imposed by the Agricultural Adjustment Act.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the provisions of section 16 of the Agricultural Adjustment Act, as amended, shall not apply to articles of machinery belting processed wholly or in chief value from cotton, if such processing was completed prior to January 1, 1930.

SEC. 2. Any tax which has been assessed or paid under such section on any such article prior to the enactment of this Act shall be credited or refunded to

¹⁴ Relates to but does not amend the Agricultural Adjustment Act.

the taxpayer, or abated if remaining unpaid: *Provided*, That claim therefor must be filed within three months after the date of enactment of this Act: *Provided further*, That no such credit, refund, or abatement shall be made with respect to any such article which was disposed of by the taxpayer prior to the filing of the claim therefor.

Approved, June 26, 1934.

ACT ENABLING CONGRESSMEN TO ENTER INTO CONTRACTS MADE UNDER THE AGRICULTURAL ADJUSTMENT ACT

48 Stat. 337, 41 U. S. C. § 22, 18 U. S. C. § 206

[PUBLIC—No. 86—73D CONGRESS]

[S. 2284]

AN ACT

Relating to contracts and agreements under the Agricultural Adjustment Act.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the provisions of section 3741¹⁵ of the Revised Statutes (U. S. C., title 41, sec. 22) and sections 114¹⁶ and 115¹⁷ of the Criminal Code of the United States (U. S. C., title 18, secs. 204 and 205) shall not apply to any contracts or agreements heretofore or hereafter entered into under the Agricultural Adjustment Act, *the Federal Farm Loan Act, as amended, the Emergency Farm Mortgage Act of 1933, as amended, the Federal Farm Mortgage Corporation Act, as amended, the Farm Credit Act of 1933, as amended, and the Home Owners' Loan Act of 1933, as amended.*

Approved, January 25, 1934.

As amended by sec. 510 of the National Housing Act, Public, No. 479, 73d Congress, approved June 27, 1934.

NATIONAL INDUSTRIAL RECOVERY ACT

48 Stat. 210; 40 U.S.C. § 411

(AUTHORIZATION FOR ALLOCATION OF \$100,000,000)

(Extract)

SEC. 220. For the purposes of this Act, there is hereby authorized to be appropriated, out of any money in the Treasury not otherwise appropriated, the sum of \$3,300,000,000. The President is authorized to allocate so much of said sum, not in excess of \$100,000,000, as he may determine to be necessary for expenditures in carrying out the Agricultural Adjustment Act and the purposes, powers, and functions heretofore and hereafter conferred upon the Farm Credit Administration.

* * * * *

Approved, June 16, 1933.

¹⁵ Sec. 3741. In every such contract or agreement to be made or entered into, or accepted by or on behalf of the United States, there shall be inserted an express condition that no member of (or delegate to) Congress shall be admitted to any share or part of such contract or agreement, or to any benefit to arise hereupon.

¹⁶ Sec. 114. 35 Stat. 1109. Whoever, being elected or appointed a Member of or Delegate to Congress, or a Resident Commissioner, shall, after his election or appointment and either before or after he has qualified, and during his continuance in office, directly or indirectly, himself, or by any other person in trust for him, or for his use or benefit, or on his account, undertake, execute, hold, or enjoy, in whole or in part, any contract or agreement, made or entered into in behalf of the United States by any officer or person authorized to make contracts on its behalf, shall be fined not more than \$3,000. All contracts or agreements made in violation of this section shall be void; and whenever any sum of money is advanced by the United States, in consideration of any such contract or agreement, it shall forthwith be repaid; and in case of failure or refusal to repay the same when demanded by the proper officer of the department under whose authority such contract or agreement shall have been made or entered into, suit shall at once be brought against the person as failing or refusing and his sureties, for the recovery of the money so advanced.

¹⁷ Sec. 115. 35 Stat. 1109. Whoever, being an officer of the United States, shall on behalf of the United States, directly or indirectly, make or enter into any contract, bargain, or agreement, in writing or otherwise, with any Member of or Delegate to Congress, or any Resident Commissioner, after his election or appointment as such Member, Delegate, or Resident Commissioner, and either before or after he has qualified, and during his continuance in office, shall be fined not more than \$3,000.

APPROPRIATION FOR COTTON, CATTLE, DAIRY PRODUCTS, ETC.

48 Stat. 805

[PUBLIC RESOLUTION—No. 27—73D CONGRESS]

[H.J.Res. 345]

(Extract)

JOINT RESOLUTION

To provide funds to enable the Secretary of Agriculture to carry out the purposes of the Acts approved April 21, 1934, and April 7, 1934, relating, respectively, to cotton and to cattle and dairy products, and for other purposes.

Resolved by the Senate and House of Representatives of the United States of America in Congress assembled, That to enable the Secretary of Agriculture to carry out the purposes of the Act entitled "An Act to place the cotton industry on a sound commercial basis, to prevent unfair competition and practices in putting cotton into the channels of interstate and foreign commerce, to provide funds for paying additional benefits under the Agricultural Adjustment Act, and for other purposes" (Public, Numbered 169, Seventy-third Congress), approved April 21, 1934, there is hereby appropriated and made available, pursuant to the authorizations contained in the said Act, the funds available for carrying into effect the provisions of the Agricultural Adjustment Act, as amended, which shall be available for administrative and other expenses, and in addition thereto, the proceeds derived from the tax levied under said Act of April 21, 1934, are hereby appropriated and made available for the purposes for which appropriations are authorized to be made under the provisions of Section 16 (c) of said Act: *Provided*, That the Secretary of Agriculture shall transfer to the Treasury Department and is authorized to transfer to other agencies out of funds hereby made available for carrying out said Act of April 21, 1934, such sums as are required to carry out the provisions of said Act, including administrative expenses and refunds of taxes.

To enable the Secretary of Agriculture to carry out the purposes of the Act entitled "An Act to amend the Agricultural Adjustment Act so as to include cattle and other products as basic agricultural commodities, and for other purposes" (Public, Numbered 142, Seventy-third Congress), approved April 7, 1934, there are hereby appropriated, out of any money in the Treasury not otherwise appropriated, pursuant to the authorizations contained in sections 2 and 6 of said Act of April 7, 1934, \$100,000,000 for the purposes of the Agricultural Adjustment Act, as amended, and \$50,000,000 for the purposes specified in section 6 of said Act of April 7, 1934, including the employment of persons and means in the District of Columbia and elsewhere and other necessary expenses; in all, \$150,000,000, to remain available until December 31, 1935.

* * * * * * *

Approved, May 25, 1934.

EMERGENCY APPROPRIATION ACT, FISCAL YEAR 1935

48 Stat. 1056

[PUBLIC—No. 412—73D CONGRESS, TITLE II]

(Extract)

EMERGENCY RELIEF

To meet the emergency and necessity for relief in stricken agricultural areas, to remain available until June 30, 1935, \$525,000,000, to be allocated by the President to supplement the appropriations heretofore made for emergency purposes and in addition thereto for (1) making loans to farmers for, and/or (2) the purchase, sale, gift, or other disposition of, seed, feed, freight, summer fallowing and similar purposes; expenditures hereunder and the manner in which they shall be incurred, allowed, and paid, shall be determined by the President, and may include expenditures for personal services and rent in the District of Columbia and elsewhere and for printing and binding and may be made without regard to the provisions of section 3709 of the Revised Statutes.

If, during the present drought emergency, a carrier subject to the Interstate Commerce Act shall, at the request of any agent of the United States, authorized so to do, establish special rates for the benefit of drought sufferers such a carrier shall not be deemed to have violated the Interstate Commerce Act with reference to undue preference or unjust discrimination by reason of the fact that it applies such special rates only to those designated as drought sufferers by the authorized agents of the United States or of any State.

The Reconstruction Finance Corporation is hereby authorized to purchase marketable securities, satisfactory to said Corporation, acquired or to be acquired by the Federal Emergency Administration of Public Works, and any sums paid for such securities shall be available to said Federal Emergency Administration of Public Works for the making of additional loans (but not grants) under the provisions of title II of the National Industrial Recovery Act: *Provided*, That the amount that the Reconstruction Finance Corporation may have invested at any one time in such securities shall not exceed \$250,000,000. The amount of notes, debentures, and bonds or other such obligations which the Reconstruction Finance Corporation is authorized and empowered to have outstanding at any one time pursuant to section 9 of the Reconstruction Finance Corporation Act, as amended, is hereby increased by the sums necessary for these purchases, not to exceed \$250,000,000.

* * * * *

Approved, June 19, 1934.

BANKHEAD COTTON ACT OF 1934, AS AMENDED

48 Stat. 598; 7 U.S.C. 701 et. seq.

[PUBLIC—No. 169—73D CONGRESS]

[H.R. 8402]

AN ACT

To place the cotton industry on a sound commercial basis, to prevent unfair competition and practices in putting cotton into the channels of interstate and foreign commerce, to provide funds for paying additional benefits under the Agricultural Adjustment Act, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

DECLARATION OF POLICY

That in order to relieve the present acute economic emergency in that part of the agricultural industry devoted to cotton production and marketing by diminishing the disparity between prices paid to cotton producers and persons engaged in cotton marketing and prices of other commodities and by restoring purchasing power to such producers and persons so that the restoration of the normal exchange in interstate and foreign commerce of all commodities may be fostered, and to raise revenue to enable the payment of additional benefits to cotton producers under the Agricultural Adjustment Act—

It is hereby declared to be the policy of Congress to promote the orderly marketing of cotton in interstate and foreign commerce; to enable producers of such commodity to stabilize their markets against undue and excessive fluctuations, and to preserve advantageous markets for such commodity, and to prevent unfair competition and practices in putting cotton into the channels of interstate and foreign commerce, and to more effectively balance production and consumption of cotton.

PERIOD OF APPLICABILITY

SEC. 2. The provisions of this Act shall be effective only with respect to the crop years 1934–1935, but if the President finds that the economic emergency in cotton production and marketing will continue or is likely to continue to exist so that the application of this Act with respect to the crop year 1935–1936 is imperative in order to carry out the policy declared in section 1, he shall so proclaim, and this Act shall be effective with respect to the crop year 1935–1936. If at any time prior to the end of the crop year 1935–1936, the President finds that the economic emergency in cotton production and marketing has ceased to exist, he shall so proclaim, and no tax under this Act shall be levied with respect to cotton harvested after the effective date of such proclamation.

SEC. 3. (a) When the Secretary of Agriculture finds, for the crop year 1935-1936, if the provisions of this Act are effective for such crop year, that two thirds of the persons who have the legal or equitable right as owner, tenant, share-cropper, or otherwise to produce cotton on any cotton farm, or part thereof, in the United States for such crop year favor a levy of a tax on the ginning of cotton in excess of an allotment made to meet the probable market requirements and determines that such a tax is required to carry out the policy declared in section 1, the Secretary shall ascertain from an investigation of the available supply of cotton and the probable market requirements the quantity of cotton that should be allotted, in accordance with the policy declared in section 1, for marketing in the channels of interstate and foreign commerce, from production of cotton during the succeeding cotton crop year, exempt from the payment of taxes thereon.

(b) The allotment so ascertained shall be proclaimed by the Secretary of Agriculture at least sixty days prior to the beginning of such succeeding crop year and shall be apportioned by him as herein provided.

(c) For the crop year 1934-1935 ten million bales is hereby fixed as the maximum amount of cotton of the crop harvested in the crop year 1934-1935, that may be marketed exempt from payment of the tax herein levied. Except as provided in section 2, the allotment plan and the tax is hereby declared to be in effect for the crop year 1934-1935.

TAX AND EXEMPTIONS

SEC. 4. (a) There is hereby levied and assessed on the ginning of cotton hereafter harvested during a crop year with respect to which this Act is in effect, a tax at the rate per pound of the lint cotton produced from ginning, of 50 per centum of the average central market price per pound of lint cotton, but in no event less than 5 cents per pound. If the cotton was harvested during a crop year with respect to which the tax is in effect, the tax shall apply even if the ginning occurs after the expiration of such crop year.

(b) The average central market price, per pound of lint cotton, shall be the average price per pound of basis seven-eighths-inch middling spot cotton on the ten spot cotton markets (designated by the Secretary of Agriculture) as determined and proclaimed from time to time by the Secretary of Agriculture. The average central market price determined and proclaimed shall be the base for determining the rate of the tax until a different average central market price for lint cotton is determined and proclaimed by the Secretary of Agriculture.

(c) Every person ginning any cotton subject to tax under this Act (whether as agent of the owner or otherwise) and every other person liable for tax under this Act shall make monthly returns under oath in duplicate and pay the taxes imposed by this Act to the collector for the district in which the ginning is done, or to such other person as such collector may direct. Such returns shall contain such information and be made at such times and in such manner as the Commissioner, with the approval of the Secretary of the Treasury, may by regulations prescribe. The tax shall, without assessment by the Commissioner or notice from the collector, be due and payable to the collector at the time so fixed for filing the return. If the tax is not paid when due, there shall be added as part of the tax interest at the rate of 1 per centum a month from the time when the tax became due until paid.

(d) When the Secretary of Agriculture does not proclaim an allotment of cotton for a crop year as provided in section 3 of this Act, the tax shall not apply with respect to cotton harvested during such crop year but shall apply to cotton harvested during the next crop year for which, with the approval of the President, the Secretary makes an allotment under such section.

(e) No tax shall be imposed under this Act with respect to—

(1) Cotton harvested by any publicly owned experimental station or agricultural laboratory.

(2) An amount of cotton harvested in any crop year from each farm equal to its allotment.

(3) Cotton harvested prior to the crop year 1934-1935.

(4) Cotton having a staple of one and one half inches in length or longer.

(f) The tax shall not be collected upon the ginning of cotton which is to be stored by the producer thereof either on the farm or at such other place as may be permitted by regulations prescribed by the Secretary of Agriculture and the Secretary of the Treasury. In such cases, the payment of the tax shall be postponed, but shall be paid at the time when bale tags are secured for such cotton. Bale tags may be secured for any of such cotton at any time after ginning (1) upon the payment to such person as the Commissioner may direct, of the amount

of tax which would have been payable at the time of ginning, or (2) upon the surrender of certificates of exemption covering an amount of cotton not less than the amount of such cotton. Until bale tags are secured for such cotton, such cotton shall be subject to a lien in favor of the United States for the amount of the tax payable with respect to the ginning of such cotton. The right to postponement of the payment of the tax under this subsection shall be established in accordance with such regulations as the Secretary of Agriculture and the Secretary of the Treasury may prescribe. The Commissioner, with the approval of the Secretary of the Treasury, shall prescribe regulations providing for stamping the containers of such cotton so as to indicate the time of ginning and the amount of tax payable with respect thereto.

(g) The right to exemption under paragraph (2) of subsection (e) shall be evidenced by a certificate of exemption issued as herein provided, which certificate of exemption shall be conclusive proof of the right to such exemption.

APPORTIONMENT

SEC. 5. (a) When an allotment is made, in order to prevent unfair competition and unfair trade practices in marketing cotton in the channels of interstate and foreign commerce, the Secretary of Agriculture shall apportion to the several cotton-producing States the number of bales the marketing of which may be exempt from the tax herein levied, which shall be determined by the ratio of the average number of bales produced in each State during the five crop years preceding the passage of this Act to the average number of bales produced in all the States during the same period: *Provided, however,* That no State shall receive an allotment of less than two hundred thousand bales of cotton if in any one year of five years prior to this date the production of the State equalled two hundred and fifty thousand bales. It is *prima facie* presumed that all cotton and its processed products will move in interstate or foreign commerce.

(b) The amount allotted to each State (less the amounts allotted under section 8) shall be apportioned by the Secretary of Agriculture to the several counties in such State on a basis and ratio, applied to such counties, similar to that set forth in subsection (a), except that, for the purposes of this subsection, there shall be excluded from the calculation of the average production of cotton in any county an amount of cotton produced in such county during any crop year or years during which the Secretary of Agriculture finds that production of cotton in such county was reduced so substantially by unusual drought, storm, flood, insect pests, or other uncontrollable natural cause that the inclusion of the cotton produced in such crop year or years would result in an apportionment to such county based upon an abnormally low production of such county, and in such cases the average production shall be calculated on the basis of the crop years and production of the years remaining of the period set forth in subsection (a).

APPLICATIONS FOR CERTIFICATES

SEC. 6. A producer of cotton desiring to secure a tax-exemption certificate may file an application therefor with the agent designated by the Secretary of Agriculture, accompanied by a statement under oath showing the approximate quantity of cotton produced on the lands presently owned, rented, share-cropped, or controlled by the applicant during a representative period fixed by the Secretary of Agriculture, and also the number of acres of land in said lands in actual cultivation for the three preceding years, and the quantity of cotton, in the best judgment of the applicant, said lands would have produced if all the cultivated land had been planted to cotton. Said application shall state any other facts which may be required by the Secretary of Agriculture. No certificate of exemption shall be issued and no allotment shall be made to any producer unless he agrees to comply with such conditions and limitations on the production of agricultural commodities by him as the Secretary of Agriculture may, from time to time, prescribe to assure the cooperation of such producer in the reduction programs of the Agricultural Adjustment Administration and to prevent expansion on lands leased by the Government of competitive production by such producer of agricultural commodities other than cotton and the allotment of and certificates of exemption issued to any producer shall be subject to revocation on violation by him of such conditions and limitations, and no criminal penalties shall apply to the violation of this provision.

SEC. 7. (a) The amount of cotton allotted to any county pursuant to section 5 (b) shall be apportioned by the Secretary of Agriculture to farms on which

cotton has been grown within such county. Such allotments to any farm shall be made upon application therefor and may be made by the Secretary based upon—

(1) A percentage of the average annual cotton production of the farm for a fair representative period; or

(2) By ascertaining the amount of cotton the farm would have produced during a fair representative period if all the cultivated land had been planted to cotton, and then reducing such amount by such percentage (which shall be applied uniformly within the county to all farms to which the allotment is made under this paragraph) as will be sufficient to bring the total of the farm allotments within the county's allotment; or

(3) Upon such basis as the Secretary of Agriculture deems fair and just, and will apply to all farms to which the allotment is made under this paragraph uniformly, within the county, on the basis or classification adopted. The Secretary of Agriculture, in determining the manner of allotment to individual farmers, shall provide that the farmers who have voluntarily reduced their cotton acreage shall not be penalized in favor of those farmers who have not done so.

(b) After the crop year 1934-1935 the apportionment shall not be on the basis set out in paragraph (1) of subsection (a) of this section.

(c) The total allotment to farms in each county under this section shall not exceed the approximate number of bales allotted to that county under section 5 (b).

SEC. 8. Whenever an allotment is made pursuant to section 3, not to exceed 10 per centum of the number of bales allotted to each State shall be deducted from the number of bales allotted to such State, and allotted in such State—

(a) To producers of cotton on farms where for the preceding three years less than one third of the cultivated land on such farms has been planted to cotton;

(b) To producers of cotton on farms not previously used in cotton production;

(c) To producers of cotton on farms where, for the preceding five years, normal cotton production has been reduced by reason of drought, storm, flood, insect pests, or other uncontrollable natural cause; and

(d) To producers of cotton on farms where, for the preceding three years, acreage theretofore planted to cotton has been voluntarily reduced so that the amount of reduction in cotton production on such farms is greater than the amount which the Secretary finds would have been an equitable reduction applicable to such farms in carrying out a reasonable reduction program.

The allotments provided for in this section shall be in addition to the amounts apportioned to the counties under section 5 (b).

EXEMPTION CERTIFICATES

SEC. 9. (a) Exemption certificates shall be issued by the Secretary of Agriculture, upon application therefor, but only upon proof satisfactory to the Secretary that the producer is entitled thereto pursuant to this Act and the regulations thereunder. Any certificate erroneously issued shall be void upon a demand in writing for its return made by the Secretary of Agriculture to the person to whom such certificate was issued.

(b) The right to a certificate of exemption shall be evidenced in such manner as the Secretary of Agriculture may by regulations prescribe.

(c) The certificate of exemption shall specify the amount of cotton exempt from the tax under section 4 (e) (2).

(d) Any and all certificates of exemption may be transferred or assigned in whole or in part in such manner as the Secretary of Agriculture may prescribe and shall be issued with detachable coupons or in such other form or forms to be prescribed by the Secretary of Agriculture as will facilitate such transfer or assignment. Any person who, in violation of the regulations made by the Secretary of Agriculture, (1) secures certificates of exemption or bale tags from another by sharp practices, or (2) speculates in certificates of exemption or bale tags, and any person securing certificates of exemption or bale tags from another person by fraud or coercion shall, upon conviction thereof, be fined not more than \$1,000 or sentenced to not more than one year's imprisonment, or both.

IDENTIFICATION OF TAX-PAID OR EXEMPT COTTON

SEC. 10. (a) Upon the payment of the tax on any cotton, or the surrender of exemption certificates covering cotton, the collector receiving such payment or certificates shall deliver to the person so paying or surrendering an appropriate number of bale tags which shall be affixed to such cotton.

(b) All cotton imported from a foreign country (including the Philippine Islands, the Virgin Islands, American Samoa, the Canal Zone, and the island of Guam) shall be packed and stamped, tagged, or otherwise identified, in addition to any import stamp indicating inspection at the customhouse, before such cotton is withdrawn therefrom.

(c) Every person who, at the time the tax becomes effective in any crop year, holds for sale (or use in the manufacture or production of an article intended for sale) any lint cotton in bales harvested during a year with respect to which the tax was not in effect may, upon application within fifteen days after the tax becomes effective, and any publicly owned experimental station or agricultural laboratory may, upon application at the time of ginning cotton harvested by it, receive an appropriate number of bale tags. Such bale tags shall be promptly affixed to the bales of lint cotton so held.

(d) In the case of any cotton in existence at the beginning of any crop year with respect to which the tax becomes effective and owned, held, or controlled by the United States, or any department or agency thereof, the Commissioner shall supply bale tags therefor free of charge, upon application by the head of the department or agency. Upon application of the Secretary of Agriculture, bale tags shall be issued free of charge for cotton held in the 1933 Cotton Producers' Pool. Bale tags issued under this section shall be securely affixed to such cotton.

DESTRUCTION OF MEANS OF IDENTIFICATION

SEC. 11. Every person emptying or breaking any bale stamped, tagged, or otherwise identified under the provisions of this Act shall, at the time of emptying or breaking such bale, destroy the bale tag.

REGULATIONS BY THE COMMISSIONER

SEC. 12. The Commissioner, with the approval of the Secretary of the Treasury, shall prescribe (a) regulations with respect to the time and manner of applying for, issuing, affixing, and destroying bale tags, and the method of accounting for receipts from the sale of and for the use of such bale tags, and (b) such other regulations as he shall deem necessary for the enforcement of the taxing provisions of this Act.

INFORMATION RETURNS

SEC. 13. (a) All persons, in whatever capacity acting, including producers, ginners, processors of cotton, and common carriers, having information with respect to cotton produced, may be required to make a return in regard thereto, setting forth the amount of cotton delivered, the name and address of the person who delivered said cotton, the amount of lint cotton produced therefrom, and any other and further information which the Commissioner, with the approval of the Secretary of the Treasury and the Secretary of Agriculture, shall by regulations prescribe as necessary for the proper administration of the tax. Any person required to make such return shall render a true and accurate return to the Commissioner.

(b) Any person willfully failing or refusing to file such a return, or filing a willfully false return, shall be guilty of a misdemeanor, and upon conviction thereof shall be punished by a fine of not more than \$1,000 or by imprisonment not exceeding one year, or both.

GENERAL AND PENAL PROVISIONS

SEC. 14. (a) All provisions of law, including penalties, applicable with respect to the taxes imposed by section 800 of the Revenue Act of 1926, shall, insofar as applicable and not inconsistent with the provisions of this Act, be applicable with respect to taxes imposed by this Act.

(b) Except as may be permitted by regulations prescribed by the Commissioner, with the approval of the Secretary of the Treasury, with due regard for the protection of the revenue, no person shall: (1) Transport, except for storing or warehousing, under the provisions of section 4 (f) beyond the boundaries of the county where produced any lint cotton to which a bale tag issued under this Act is not attached; or (2) sell, purchase, or open any bale of lint cotton to which a bale tag issued under this Act is not attached.

(c) No seed cotton harvested during a crop year with respect to which the tax is in effect shall be exported from the United States or any possession thereof

to which this Act applies to any possession of the United States to which this Act does not apply or to any foreign country.

(d) Any person who willfully violates any provision of this Act, or who willfully fails to pay, when due, any tax imposed under this Act, or who, with intent to defraud, falsely makes, forges, alters, or counterfeits any bale tag or certificate of exemption made or used under this Act, or who uses, sells, or has in his possession any such forged, altered, or counterfeited bale tag or certificate of exemption, or any plate or die used, or which may be used in the manufacture thereof, or has in his possession any bale tag which should have been destroyed as required by this Act, or who makes, uses, sells, or has in his possession any paper in imitation of the paper used in the manufacture of any such bale tag or certificate of exemption, or who reuses any bale tag required to be destroyed by this Act, or who places any cotton in any bale which has been filled and stamped, tagged, or otherwise identified under this Act, without destroying the bale tag previously affixed to such bale, or who affixes any bale tag issued under this Act to any bale of lint cotton on which any tax due is unpaid, or who makes any false statement in any application for bale tags or certificates of exemption under this Act, or who has in his possession any such bale tags or certificates of exemption obtained by him otherwise than as provided in this Act, shall on conviction be punished by a fine not exceeding \$1,000, or by imprisonment for not exceeding 6 months, or both.

(e) Any person who willfully violates any regulation issued by the Secretary of Agriculture or the Secretary of Agriculture and the Secretary of the Treasury under this Act, for the violation of which a special penalty is not provided, shall, on conviction thereof, be punished by a fine not exceeding \$200.

REGULATIONS BY THE SECRETARY OF AGRICULTURE

SEC. 15. (a) The Secretary of Agriculture is authorized to make such regulations as may be necessary to carry out the powers vested in him by the provisions of this Act.

(b) The Secretary of Agriculture may make regulations protecting the interests of share-croppers and tenants in the making of allotments and the issuance of tax-exemption certificates under this Act.

APPROPRIATIONS AUTHORIZED

SEC. 16. (a) There is hereby authorized to be appropriated such sums as may be necessary to carry out the provisions of this Act.

(b) Out of the sums available to the Secretary of Agriculture under the Agricultural Adjustment Act, such sums as may be necessary to carry out the provisions of this Act are authorized to be made available.

(c) The proceeds derived from the tax are hereby authorized to be appropriated to be made available to the Secretary of Agriculture for the purposes of carrying out the cotton program of the Agricultural Adjustment Administration, and for administrative expenses and refunds of taxes under this Act.

OFFICERS AND EMPLOYEES

SEC. 17. The Secretary of Agriculture is authorized, in order to carry out the provisions of this Act, to appoint, without regard to the provisions of the civil service laws, such officers, agents, and employees, and to utilize such Federal officers and employees, and with the consent of the State, such State and local officers and employees, as he may find necessary, to prescribe their authorities, duties, responsibilities, and tenure and, without regard to the Classification Act of 1923, as amended, to fix the compensation of any officers and employees so appointed, except that rates so fixed shall not exceed the rates of compensation prescribed for comparable duties by such Act, as amended.

PURCHASES AND SERVICES

SEC. 18. The administrative expenses provided for under this Act shall include, among others, expenditures for personal services and rent in the District of Columbia and elsewhere for law books, periodicals, newspapers, and books of reference, for contract stenographic reporting services, and for printing and paper in addition to allotments under the existing law.

COLLECTION OF TAXES

SEC. 19. The taxes provided for by this Act shall be collected by the Commissioner of Internal Revenue under the direction of the Secretary of the Treasury. Taxes collected shall be paid into the Treasury of the United States.

REFUNDS

SEC. 20. (a) No refund of any tax, penalty, or sum of money paid shall be allowed under this Act unless claim therefor is presented within six months after the date of payment of such tax, penalty, or sum.

(b) No suit or proceeding shall be maintained in any court for the recovery of any tax under this Act alleged to have been erroneously or illegally assessed or collected, or of any penalty claimed to have been collected without authority, or of any sum alleged to have been excessive or in any manner wrongfully collected until a claim for refund or credit has been duly filed with the Commissioner of Internal Revenue, according to the provisions of law in that regard, and the regulations of the Secretary of the Treasury, established in pursuance thereof; but such suit or proceeding may be maintained, whether or not such tax, penalty, or sum has been paid under protest or duress. No suit or proceeding shall be begun before the expiration of six months from the date of filing such claim, unless the Commissioner renders a decision therein within that time, nor after the expiration of two years from the date of the payment of such tax, penalty, or sum, unless such suit or proceeding is begun within two years after the disallowance of the part of such claim to which such suit or proceeding relates. The Commissioner shall, within ninety days after any such disallowance, notify the taxpayer thereof by registered mail.

SEPARABILITY OF PROVISIONS

SEC. 21. If any provision of this Act, or the applicability thereof to any person or circumstance, is held invalid, the remainder of this Act and the applicability of such provision to other persons or circumstances shall not be affected thereby.

GEOGRAPHICAL APPLICATION OF ACT

SEC. 22. The provisions of this Act shall be applicable to the United States and its possessions, except the Philippine Islands, the Virgin Islands, American Samoa, the Canal Zone, and the island of Guam.

DEFINITIONS

SEC. 23. As used in this Act—

(a) The term "person" means an individual, a partnership, joint-stock company, a corporation, or a firm.

(b) The term "Commissioner" means the Commissioner of Internal Revenue.

(c) The term "collector" means the collector of internal revenue.

(d) The term "ginning" means the separation of lint cotton from seed cotton.

(e) The term "tax" means the tax upon the ginning of cotton imposed by this Act.

(f) The term "lint cotton" means the fiber taken from seed cotton by ginning.

(g) The term "seed cotton" means the harvested fruit of the cotton plant.

(h) The term "bale tag" means nondetachable bale tag, stamp, or other means of identifying tax-paid or exempt cotton.

(i) The term "crop year" means the period from June 1 of one year to May 31 of the succeeding year, both dates inclusive.

The term "bale", when used in sections 3, 5, 7, and 8 to describe a quantity of cotton, means five hundred pounds of lint cotton.

SEC. 24. The Secretary of Agriculture is authorized to develop new and extended uses for cotton, and for such purpose there is authorized to be made available to the Secretary not to exceed \$500,000 out of the funds available to him under section 12 of the Agricultural Adjustment Act.

SEC. 25. (a) No tax-exemption certificates shall be issued to any person not engaged in production of cotton in the crop year during which such certificates are issued.

(b) Whenever after apportionment under sections 7 and 8 any surplus number of bales remain of the amount allotted to any county under section 5 (b) such surplus bales shall be allotted, in such quantities as the Secretary of Agriculture determines, to such other counties within the State as the Secretary of Agriculture determines have an insufficient allotment. Said bales shall be apportioned, pursuant to sections 7 and 8,

within the respective counties to which allotted, but in no case shall any farm receive any of such allotment so as to receive a total allotment in excess of its estimated production for the crop year in which such allotment is made.

(c) In computing the production of any State pursuant to section 5 (a) the total production of cotton for such State in the five-year period, 1928-1932, inclusive, shall be used regardless of the length of staple of such production.

Sec. 25 added by Pub. Res. No. 45, 73d Congress, approved June 20, 1934.

Approved, April 21, 1934.

OATHS UNDER BANKHEAD COTTON ACT

48 Stat. 911; 7 U.S.C. § 726

[PUBLIC RESOLUTION—No. 29—73D CONGRESS]

[S.J.Res. 123]

JOINT RESOLUTION

Empowering certain agents authorized by the Secretary of Agriculture to administer oaths to applicants for tax-exemption certificates under the Cotton Act of 1934.

Resolved by the Senate and House of Representatives of the United States of America in Congress assembled, That any county agent or member of a county committee or community committee of a cotton-production-control association who is authorized in writing by the Secretary of Agriculture to act as his agent in the administration of the Agricultural Adjustment Act shall, while he is acting as such agent, have power to administer oaths to persons making applications (if made within the county in which such agent is authorized to act) for tax-exemption certificates under section 6 of the Act of April 21, 1934, entitled "An Act to place the cotton industry on a sound commercial basis, to prevent unfair competition and practices in putting cotton into the channels of interstate and foreign commerce, to provide funds for paying additional benefits under the Agriculture Adjustment Act, and for other purposes", but no fee or compensation shall be charged or received by any such agent for administering such an oath.

Approved, June 6, 1934.

KERR TOBACCO ACT

48 Stat. 1275

[PUBLIC—No. 483—73D CONGRESS]

[H.R. 9690]

AN ACT

To place the tobacco-growing industry on a sound financial and economic basis, to prevent unfair competition and practices in the production and marketing of tobacco entering into the channels of interstate and foreign commerce, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

DEFINITIONS

SECTION 1. As used in this Act—

(a) The term "person" includes an individual, a partnership, association, joint-stock company, corporation, or a firm, and imports the plural as well as the singular, as the case demands.

(b) The term "Commissioner" means the Commissioner of Internal Revenue.

(c) The term "collector" means the collector of internal revenue.

(d) The term "tobacco" means any type or types of tobacco specified in any agreement between the Secretary of Agriculture and a contracting producer.

(e) The term "sale" means the first bona fide sale of each pound of tobacco harvested subsequent to the enactment of this Act.

(f) The term "tax" means the tax imposed by this Act upon the sale of tobacco.

(g) The term "contracting producer" means any person who (pursuant to the provisions of the Agricultural Adjustment Act) agrees in writing with the Secretary of Agriculture to plant not more than the number of acres of tobacco, and/or to market not more than the number of pounds of tobacco, permitted in such agreement.

- (h) The term "crop year" means the period May 1 to April 30.
- (i) The term "Maryland tobacco" means the kind of air-cured tobacco classified as type 32 in the United States Department of Agriculture, Bureau of Agricultural Economics, Service and Regulatory Announcements Numbered 118.
- (j) The term "cigar leaf tobacco" means all leaf tobacco classified in classes 4, 5, and 6 in the United States Department of Agriculture, Bureau of Agricultural Economics, Service and Regulatory Announcements Numbered 118.
- (k) The term "Virginia sun-cured tobacco" means all sun-cured tobacco classified as type 37 in the United States Department of Agriculture, Bureau of Agricultural Economics, Service and Regulatory Announcements Numbered 118.

DECLARED POLICY

SEC. 2. It is hereby declared to be the policy of Congress to promote the orderly marketing of tobacco in interstate and foreign commerce, to enable producers of tobacco to stabilize their markets against undue and excessive fluctuations, to prevent unfair competition and practices in putting tobacco into the channels of interstate and foreign commerce, and to more effectively balance production and consumption of tobacco, and to relieve the present emergency with respect to tobacco.

IMPOSITION

SEC. 3. (a) There is hereby levied and assessed on the sale of tobacco with respect to which the tax is applicable a tax at the rate of 33½ per centum of the price for which such tobacco is sold: *Provided, however*, That if the Secretary of Agriculture determines and proclaims that the declared policy of this Act is best effectuated thereby, the rate of tax shall, for such period as the Secretary of Agriculture designates, be at such lower rate (not less than 25 per centum of the price for which such tobacco is sold) as he may prescribe.

(b) The tax provided for by subsection (a) of this section shall be applicable to all tobacco harvested in the crop year 1934-1935, except Maryland tobacco, Virginia sun-cured tobacco, and cigar leaf tobacco. Thereafter whenever the Secretary of Agriculture determines that the persons who own, rent, share crop, or control three fourths of the land customarily engaged in the production of any particular type of tobacco favor the levy of the tax thereon and that the imposition of the tax thereon is necessary for the orderly marketing of such tobacco in interstate and foreign commerce and to effectuate the declared policy of this Act, he shall proclaim such determination at least sixty days prior to the next succeeding crop year, and the tax shall thereafter apply to tobacco of such type harvested during the crop year next following the date of such proclamation. The tax provided for by subsection (a) of this section shall not apply to any tobacco harvested after April 30, 1936.

(c) The provisions of this Act shall be applicable to the United States and its possessions, except the Philippine Islands, the Virgin Islands, American Samoa, the Canal Zone, and the island of Guam.

EXEMPTIONS

SEC. 4. (a) No tax shall be imposed under this Act—

(1) Upon the tobacco harvested by any publicly owned experimental station or agricultural laboratory; or

(2) Upon tobacco harvested prior to the crop year 1934-1935.

(b) Under such rules and regulations as the Commissioner, with the approval of the Secretary of the Treasury, may prescribe, every person who, at the time the tax becomes applicable with respect to any type of tobacco, holds for sale (or use in the manufacture or production of an article intended for sale) any tobacco of such type harvested prior to the crop year 1934-1935 shall cause such tobacco to be tagged, stamped, or otherwise identified as tax-exempt tobacco.

SEC. 5. (a) In addition to rental or benefit payments which under any provision of existing law the Secretary of Agriculture is authorized to make in connection with agreements with producers providing for reduction in the acreage or reduction in the production for market, or both, of any basic agricultural commodity, the Secretary of Agriculture is hereby authorized and directed to issue (in each crop year wherein any type of tobacco is harvested to which the tax is applicable) to each contracting producer nontransferable tax-payment warrants (each such warrant to be expressed in pounds of tobacco of a particular type). Upon surrender of any warrant by any contracting producer to the collector, it

shall be accepted by the collector and the Secretary of the Treasury in payment of the tax on any sale by such contracting producer of the type of tobacco specified in the warrant not exceeding in amount the amount of tobacco covered by such warrant. Any contracting producer shall be entitled to receive such warrants covering amounts of any type of tobacco produced by him equal (1) to the number of pounds of tobacco of such type which such contracting producer is permitted to market under any agreement between him and the Secretary of Agriculture, or (2) to the number of pounds of tobacco of such type which the Secretary of Agriculture estimates may be produced on a percentage of a base acreage, which percentage and base acreage shall be determined as provided in any agreement between the Secretary of Agriculture and such contracting producer.

(b) The Secretary of Agriculture may issue in any county further warrants, covering an amount of tobacco of any type not in excess of 6 per centum of the amount of tobacco of such type covered by the warrants issued to all contracting producers in such county, to persons engaged in the production of tobacco of such type in such county as to whom the Secretary determines that no equitable allotment of tobacco acreage or production is possible under tobacco-reduction contracts offered pursuant to the Agricultural Adjustment Act: *Provided*, That warrants covering two-thirds of the amount of tobacco allotted under the subsection in any county shall be issued to growers whose allotments are 1,500 pounds or less. Warrants issued under this subsection shall be accepted by the collector and the Secretary of the Treasury, upon surrender thereof by the person to whom issued, in payment of the tax on any sale by such person of the type of tobacco specified in the warrant not exceeding in amount the amount of tobacco covered by such warrant.

(c) Upon application therefor, the warrants provided for by subsections (a) and (b) of this section may be issued by the Secretary of Agriculture, or his duly authorized agent, in such manner, at such time or times, at such place or places, and in such form as the Secretary of Agriculture may prescribe.

(d) Any tax-payment warrant erroneously issued shall be void upon demand in writing for its return made by the Secretary of Agriculture to the person to whom such warrant was issued.

(e) The right to a tax-payment warrant under this section shall be evidenced in such manner as the Secretary of Agriculture may by regulations prescribe.

(f) The Secretary of Agriculture may make regulations protecting the interests of share-croppers and tenants in the issuance of tax-payment warrants under this Act.

COLLECTION OF TAXES

SEC. 6. (a) The taxes provided for in this Act shall be paid by the seller and collected by the Bureau of Internal Revenue under the direction of the Secretary of the Treasury. Such taxes shall be paid into the Treasury of the United States.

(b) All provisions of law, including penalties (except section 1121 of the Revenue Act of 1926), applicable with respect to the taxes imposed by section 600 of the Revenue Act of 1926, and the provisions of section 626 of the Revenue Act of 1932, shall, insofar as applicable and not inconsistent with the provisions of this Act, be applicable in regard to all taxes imposed by this Act.

RULES AND REGULATIONS

SEC. 7. (a) The Commissioner, with the approval of the Secretary of the Treasury, shall prescribe such rules and regulations as he may deem needful for the collection of the tax.

(b) The Secretary of Agriculture is authorized to make such rules and regulations as may be necessary to carry out the powers vested in him by the provisions of this Act.

INFORMATION RETURNS

SEC. 8. (a) All producers, warehousemen, processors of tobacco, and common carriers, having information with respect to tobacco produced or sold, may be required to make a return in regard thereto, setting forth the amount of tobacco produced, sold, or delivered, the name and address of the person who produced, sold, or delivered said tobacco, or to whom said tobacco was sold or delivered, the price paid on such sale, and any other and further information which the Commissioner of Internal Revenue, with the approval of the Secretary of the Treasury shall by regulations prescribe as necessary for the collection of the tax. Any person required to make such return shall render a true and accurate return to the Commissioner of Internal Revenue.

(b) Any person willfully failing or refusing to file such a return, or filing a willfully false return, shall be guilty of a misdemeanor and, upon conviction thereof, shall be punished by a fine of not more than \$1,000.

GENERAL AND PENAL PROVISIONS

SEC. 9. (a) No tax-payment warrant issued in accordance with this Act may be transferred or assigned either in whole or in part, except by the executor or other legal representative of a deceased producer to whom a tax-payment warrant has been issued under this Act. Any person who acquires a tax-payment warrant from another person or who transfers a tax-payment warrant to another person in violation of the provisions of this Act, or who violates any provision of this Act, shall be guilty of a misdemeanor and shall, upon conviction thereof, be fined not more than \$1,000 or sentenced to not more than six months' imprisonment, or both.

(b) Any person who, with intent to defraud, forges, makes, or counterfeits any tax-payment warrant or any stamp, tag, or other means of identification made or used under this Act, or makes any false entry upon such warrant or any false statement in any application for the issuance of such warrant, or who uses, sells, lends, or has in his possession any such altered, forged, or counterfeited warrant, stamp, tag, or other means of identification, or who makes, uses, sells, or has in his possession any material in imitation of the material used in the manufacture of such warrants, stamps, tags, or other means of identification, or who makes any false statement in any application with respect to the levying and collection of the tax, shall, upon conviction thereof, be punished by a fine not exceeding \$5,000 or by imprisonment not exceeding five years, or both.

APPROPRIATIONS AND ADMINISTRATIVE EXPENSES

SEC. 10. (a) The proceeds derived from the tax are hereby appropriated to be available to the Secretary of Agriculture for administrative expenses and refunds of taxes and other payments under this Act. The Secretary of Agriculture and the Secretary of the Treasury shall estimate from time to time the amount of the tax which will be collected during a period following any such estimate not in excess of four months, and the Secretary of the Treasury shall, out of any money in the Treasury not otherwise appropriated, advance to the Secretary of Agriculture the amounts so estimated. The amount of any such advance shall be deducted from such tax proceeds as shall subsequently become available under this subsection.

(b) Out of the sums available to the Secretary of Agriculture under the Agricultural Adjustment Act, as amended, such sums as may be necessary for administrative expenses, refunds of taxes, and other payments under this Act are hereby made available.

(c) The Secretary of Agriculture is authorized in order to carry out the provisions of this Act to appoint, without regard to the provisions of the civil-service laws, such officers, agents, and employees, and to utilize such Federal officers and employees and, with the consent of the State, such State and local officers and employees, as he may find necessary, to prescribe their authorities, duties, responsibilities, and tenure, and, without regard to the Classification Act of 1923, as amended, to fix the compensation of any officers, agents, and employees so appointed.

(d) The administrative expenses provided for under this section shall include, among others, expenditures for personal services and rent in the District of Columbia and elsewhere, for law books, periodicals, newspapers, and books of reference, for contract stenographic reporting services, and for printing and paper in addition to allotments under the existing law.

(e) The Secretary of Agriculture shall transfer to the Treasury Department, and is authorized to transfer to other agencies, out of funds available for administrative expenses under this Act, such sums as are required to pay administrative expenses incurred and refunds made by such Department or agencies in the administration of this Act.

REFUNDS

SEC. 11. (a) No refund of any tax, penalty, or interest paid under this Act shall be allowed unless claim therefor is presented within six months after the date of payment of such tax, penalty, or interest.

(b) No suit or proceeding shall be maintained in any court for the recovery of any tax under this Act alleged to have been erroneously or illegally assessed or collected, or of any penalty claimed to have been collected without authority, until a claim for refund or credit has been duly filed with the Commissioner of Internal Revenue, according to the provisions of law in that regard, and the regulations prescribed by the Commissioner of Internal Revenue and approved by the Secretary of the Treasury, under this Act; but such suit or proceeding may be maintained whether or not such tax, penalty, or interest has been paid under protest or duress. No suit or proceeding shall be begun before the expiration of six months from the date of filing such claim, unless the Commissioner renders a decision thereon within that time, nor after the expiration of two years from the date of the payment of such tax, penalty, or interest, unless such suit or proceeding is begun within two years after the disallowance of the claim or of the part of such claim to which such suit or proceeding relates. The Commissioner shall, within ninety days after any such disallowance, notify the taxpayer thereof by mail.

SEPARABILITY OF PROVISIONS

SEC. 12. If any provision of this Act, or the applicability thereof to any person or circumstance, is held invalid the remainder of this Act and the applicability thereof and of such provision to other persons or circumstances shall not be affected thereby.

TERMINATION

SEC. 13. The tax shall terminate with respect to any type of tobacco at the end of the crop year current at the time the Secretary of Agriculture proclaims that rental and/or benefit payments under the Agricultural Adjustment Act are to be discontinued with respect to such type of tobacco or whenever the President finds and proclaims that the national economic emergency with respect to such type of tobacco has ended, whichever is the earlier.

SEC. 14. The Secretary of Agriculture is directed not to refuse on the ground of lateness any offer by a tobacco producer to become a contracting producer, if such offer is filed with the Secretary of Agriculture within thirty days after the date of the enactment of this Act.

SEC. 15. Having due regard to the welfare of domestic producers of tobacco and to the protection of domestic consumers thereof and to a just relation between the price received by such domestic producers and the price paid by such domestic consumers and in other respects to effectuate the declared policy of this Act, the Secretary of Agriculture may from time to time, by orders or regulations:

(A) For each crop year in which any type of tobacco is harvested to which the tax is applicable, or for any part of such crop year, establish quotas for the importation into continental United States of cigar-leaf types of tobacco, and during such crop year readjust any such quotas. Such quotas shall be based on average quantities of such tobacco imported into continental United States during the crop years 1932-1933 and 1933-1934, except that in the case of tobacco imported from the Republic of Cuba, such quotas shall be based on average quantities of tobacco so imported during the crop years 1928-1933.¹⁸

(B) Allot the quotas provided for by subsection (A) to the importers of such tobacco in the United States in such manner as he may deem fair and equitable having due regard to the respective amounts of tobacco imported during the crop years 1932-1933 and 1933-1934 by such persons.

SEC. 16. After importation quotas therefor have been established, all cigar-leaf tobacco of any type imported into continental United States in excess of the quota for such type shall be subject to an import tax. The rate of the import tax, expressed in cents per pound, shall be determined by the Secretary of Agriculture as hereinafter provided. On May 1 of each crop year for which quotas are to be established pursuant to section 15, the Secretary of Agriculture shall determine (from available statistics of the Department of Agriculture) the average sales price per pound, during the preceding twelve months, of all domestic cigar-leaf tobacco the sale of which is to be taxed during the ensuing crop year under this Act. This average sales price, times the average per centum tax rate then current under this Act on the sale of such domestic cigar-leaf tobacco, shall be the rate per pound of the import tax and shall be proclaimed by the Secretary of Agriculture. The import tax shall be paid prior to the release of the tobacco subject thereto from customs custody or control.

¹⁸ Passed Senate as 1926-1933, but was engrossed as 1928-1933. The House adopted the provision as engrossed.

As used in this and the preceding section "cigar-leaf types of tobacco" shall include cigars, which for the purposes of the quotas, allotments, and import tax provided for by said sections shall be translated into terms of raw cigar-leaf tobacco of the respective types from which such cigars are produced, pursuant to conversion factors established and proclaimed by the Secretary of Agriculture.

Approved, June 28, 1934.

CROP PRODUCTION LOANS, FEED FOR LIVESTOCK IN DROUGHT AND STORM-STRICKEN AREAS

48 Stat. 354

[PUBLIC—No. 97—73D CONGRESS]

(Extract)

SEC. 2. (c) No loan shall be made under this Act to any applicant who shall not have first established to the satisfaction of the proper officer or employee of the Farm Credit Administration, under such regulations as the Governor may prescribe (1) that such applicant is unable to procure from other sources a loan in an amount reasonably adequate to meet his needs for the purposes for which loans may be made under this Act; and (2) that such applicant is cooperating directly in the crop production control program of the Agricultural Adjustment Administration or is not proposing to increase his 1934 production of basic agricultural commodities in a manner detrimental to the success of such program.

* * * * *

Approved February 23, 1934.

APPENDIX B—PROCESSING TAXES

EXHIBIT 2

Summary statement of processing and related taxes collected (gross)—All commodities through Dec. 31, 1934, as reported by the Bureau of Internal Revenue—Analyzed by State and month

State	Total	July 1933	August 1933	September 1933	October 1933	November 1933	December 1933	January 1934	February 1934
Alabama.....	\$12,021,810.75	\$2,068.06	\$137,710.46	\$407,626.00	\$901,650.98	\$601,861.52	\$1,165,086.11	\$1,058,921.34	\$815,673.35
Arizona.....	512,768.72	987.61	26,173.43	26,173.43	37,008.74	12,418.63	22,531.13	32,481.63	43,792.89
Arkansas.....	723,617.32	6,250.09	59,057.85	84,231.52	113,696.78	61,129.10	69,959.39	51,364.23	16,226.08
California.....	21,957,627.33	17,250.95	661,162.07	798,398.90	1,042,065.50	841,417.97	952,860.47	909,887.73	768,600.95
Colorado.....	7,757,410.69	5,964.95	124,930.00	163,109.70	311,309.69	322,617.55	309,252.31	353,572.53	238,799.77
Connecticut.....	2,633,432.97	4,381.42	82,115.84	332,178.08	225,288.14	166,466.88	312,144.48	137,467.01	134,000.18
Delaware.....	719,492.55	807.42	40,708.57	78,556.92	48,616.98	25,976.65	52,797.61	19,488.23	18,047.58
Florida.....	890,715.93	3,455.93	48,357.33	54,286.70	53,817.73	49,523.88	83,191.79	76,400.50	18,987.33
Georgia.....	28,007,339.71	7,564.49	173,759.28	731,474.02	1,034,047.71	1,774,095.02	3,074,706.60	2,495,351.01	1,672,933.63
Hawaii.....	704,015.89	90.97	41,121.01	38,598.88	20,611.29	13,540.75	24,421.71	236,706.35	54,804.69
Idaho.....	747,150.64	961.19	23,679.94	36,249.16	41,284.18	24,359.60	40,599.37	47,572.18	33,280.47
Illinois.....	106,858,350.07	21,100.83	1,134,434.99	709,131.77	1,163,263.13	2,446,314.31	3,010,559.25	8,046,607.09	7,743,073.28
Indiana.....	11,014,821.02	12,212.09	350,968.26	350,968.26	397,074.01	277,157.39	703,828.02	480,812.78	1,470,455.03
Iowa.....	20,123,164.35	15,161.82	143,779.33	152,671.81	187,251.03	120,542.43	626,208.31	602,347.12	1,170,080.99
Kansas.....	19,700,093.92	12,256.03	499,205.83	1,090,036.88	1,088,001.22	801,203.53	901,366.99	1,884,035.04	1,083,188.90
Kentucky.....	8,174,672.52	3,887.99	66,826.98	146,187.84	272,920.09	384,619.62	536,649.85	577,604.73	413,723.38
Louisiana.....	4,458,298.54	10,812.69	299,370.86	255,531.06	235,531.06	125,548.24	147,838.38	110,374.80	140,594.32
Maine.....	2,719,691.56	4,176.79	106,427.33	155,790.88	237,960.86	247,962.20	291,614.20	299,272.61	138,122.20
Maryland, including District of Columbia.....	8,129,837.18	9,000.61	330,663.58	313,875.92	287,609.04	440,125.69	401,914.20	387,386.30	321,634.13
Massachusetts.....	31,411,283.81	12,366.33	296,868.06	1,510,382.25	1,734,379.88	1,191,655.38	5,269,217.24	2,398,417.20	1,322,854.87
Michigan.....	7,633,765.63	3,854.78	194,453.60	344,597.22	375,997.80	509,903.93	518,605.19	390,104.74	299,175.71
Minnesota.....	39,833,026.98	9,473.04	819,666.17	1,713,120.45	2,880,947.46	2,227,640.93	1,739,580.09	2,677,666.61	2,465,235.35
Mississippi.....	1,149,406.29	6,155.45	53,083.88	90,640.15	148,982.64	53,355.69	85,385.62	123,246.17	35,255.97
Missouri.....	28,044,198.51	32,514.31	820,495.64	954,208.13	1,186,924.11	1,534,186.38	2,039,015.53	1,314,443.35	1,810,222.57
Montana.....	2,872,907.87	2,559.53	115,210.32	97,672.98	110,323.69	142,276.96	160,241.73	154,133.59	188,183.21
Nebraska.....	7,880,777.95	7,433.03	125,422.72	409,598.35	187,332.07	214,357.24	446,624.42	478,347.85	355,779.96
Nevada.....	166,906.35	2,060.39	24,785.65	63,071.06	4,126.51	7,048.65	5,183.27	256,951.34	3,722.83
New Hampshire.....	2,719,230.86	5,791.08	66,641.20	135,595.37	70,327.09	158,350.88	430,481.55	231,213.22	331,654.04
New Jersey.....	5,798,246.98	5,791.14	220,174.87	330,175.60	255,244.74	342,691.77	660,066.93	231,213.22	331,654.04
New Mexico.....	3,695.49	25,618.32	29,643.14	17,705.60	17,705.60	5,636.55	14,754.82	10,745.40	7,179.03
New York.....	69,306,272.06	15,872.20	2,780,889.39	2,863,325.82	4,140,041.64	4,248,517.61	4,595,752.27	4,455,818.30	3,296,101.86
North Carolina.....	47,935,773.30	3,208.51	229,267.68	858,957.56	2,069,401.97	1,948,000.62	6,443,699.41	4,023,432.70	3,059,430.50
North Dakota.....	1,628,189.33	6,067.28	91,318.88	99,364.31	137,653.95	105,067.88	114,851.75	111,825.97	60,489.37
Ohio.....	21,483,283.41	15,308.56	481,125.19	864,193.11	1,164,909.82	1,125,977.92	1,224,124.44	1,378,376.56	926,438.51
Oklahoma.....	5,666,101.87	5,056.19	83,851.47	192,405.95	247,118.35	358,042.86	382,830.00	426,216.82	321,343.26
Oregon.....	4,496,738.03	6,503.69	125,797.44	256,997.04	218,005.61	269,974.77	269,974.77	292,840.79	141,703.41
Pennsylvania.....	20,204,178.92	26,833.18	647,733.26	1,114,059.59	1,094,460.72	993,850.31	1,094,511.96	883,882.51	659,107.94
Rhode Island.....	4,481,580.07	7,743.48	70,942.35	447,196.20	385,960.16	380,759.03	589,182.77	550,510.81	44,254.04

State	March 1934	April 1934	May 1934	June 1934	July 1934	August 1934	September 1934	October 1934	November 1934	December 1934
South Carolina.....	25, 917, 153.08	1, 566.64	93, 326.55	803, 797.78	1, 559, 884.08	860, 701.51	3, 028, 733.83	2, 375, 075.75	1, 716, 232.11	
South Dakota.....	706, 840.59	1, 788.29	42, 850.26	23, 909.09	51, 285.44	28, 400.68	27, 692.90	61, 823.46	43, 433.04	
Tennessee.....	9, 001, 490.10	9, 413.38	184, 119.69	364, 293.80	477, 697.54	438, 462.84	1, 013, 818.84	479, 840.64	413, 134.01	
Texas.....	16, 998, 970.32	28, 012.93	478, 978.79	610, 957.73	1, 232, 902.40	793, 814.92	1, 212, 646.73	1, 070, 367.95	782, 813.13	
Utah.....	1, 503, 506.66	1, 310.10	18, 539.66	34, 373.99	32, 128.56	26, 274.43	57, 636.73	32, 344.43	34, 571.36	
Vermont.....	1, 419, 092.67	3, 660.93	25, 072.27	29, 719.86	36, 351.50	9, 404.70	36, 139.12	21, 654.08	13, 919.05	
Virginia.....	10, 921, 820.25	8, 613.79	112, 842.78	224, 646.64	441, 558.29	537, 709.20	1, 014, 825.97	899, 533.76	493, 614.53	
Washington, including Alaska.....	6, 646, 848.98	12, 424.36	203, 898.90	369, 634.95	343, 992.69	235, 771.76	435, 051.54	174, 197.97	265, 347.90	
West Virginia.....	1, 579, 025.25	7, 115.76	72, 521.86	121, 465.58	131, 602.52	140, 439.57	122, 522.40	64, 907.39	94, 184.40	
Wisconsin.....	6, 470, 102.94	3, 802.35	242, 054.87	228, 142.55	224, 251.59	167, 770.83	275, 532.95	234, 643.92	358, 027.56	
Wyoming.....	6, 321, 865.46	757.68	8, 800.19	21, 568.04	20, 573.81	22, 331.84	20, 283.19	21, 045.55	13, 028.60	
Total.....	640, 871, 403.32	383, 088.26	12, 576, 352.36	21, 126, 566.77	28, 863, 975.56	27, 813, 559.44	45, 255, 746.11	43, 637, 649.41	34, 918, 638.84	
Alabama.....	\$757, 613.60	\$712, 354.57	\$767, 111.96	\$905, 810.43	\$987, 705.66	\$423, 590.24	\$785, 087.50	\$407, 401.20	\$443, 601.17	\$1, 040, 303.60
Arizona.....	44, 822.46	32, 768.18	37, 389.29	21, 918.88	33, 621.74	29, 714.19	19, 089.07	25, 490.44	39, 153.33	32, 442.33
Arkansas.....	22, 627.80	24, 279.25	35, 306.59	25, 069.15	28, 972.21	29, 862.38	21, 383.40	24, 856.49	14, 823.92	34, 521.09
California.....	1, 085, 422.79	851, 344.47	1, 133, 013.89	1, 582, 176.91	363, 158.86	1, 049, 506.87	1, 654, 423.28	2, 966, 616.51	2, 680, 089.75	2, 600, 295.12
Colorado.....	309, 621.23	273, 467.23	439, 454.31	437, 691.61	372, 280.98	714, 563.28	793, 741.35	1, 069, 419.48	759, 417.59	1, 099, 196.89
Connecticut.....	136, 490.20	159, 859.17	175, 452.40	187, 060.53	145, 150.08	95, 190.12	132, 025.91	59, 842.47	116, 022.41	72, 277.65
Delaware.....	36, 539.39	60, 670.77	32, 578.95	21, 152.54	56, 022.91	50, 320.75	50, 474.81	50, 468.53	52, 217.60	54, 043.34
Florida.....	63, 965.86	44, 366.33	65, 892.69	65, 484.34	36, 359.81	46, 613.04	88, 026.96	54, 566.44	59, 685.48	100, 034.33
Georgia.....	1, 876, 902.13	1, 070, 954.33	2, 169, 658.14	2, 084, 944.27	1, 770, 420.26	1, 898, 896.51	1, 322, 178.95	1, 828, 556.65	1, 438, 736.77	1, 612, 680.02
Hawaii.....	124, 118.91	37, 273.31	38, 174.84	38, 631.45	9, 300.01	22, 291.15	10, 278.75	11, 682.47	10, 389.33	9, 083.06
Idaho.....	48, 105.39	37, 273.31	38, 174.84	38, 631.45	9, 300.01	22, 291.15	10, 278.75	11, 682.47	10, 389.33	9, 083.06
Illinois.....	3, 702, 045.90	5, 967, 394.76	9, 574, 398.67	9, 834, 756.46	9, 841, 966.35	9, 489, 105.21	8, 799, 025.60	10, 348, 593.52	9, 572, 845.84	5, 013, 733.11
Indiana.....	643, 749.32	797, 167.59	822, 948.75	593, 814.52	819, 761.92	757, 903.48	794, 345.83	1, 100, 427.02	829, 554.70	923, 916.00
Iowa.....	1, 477, 631.23	1, 523, 961.62	1, 647, 767.41	1, 874, 615.22	1, 328, 678.87	2, 286, 383.70	1, 496, 883.35	1, 312, 342.34	1, 822, 238.71	1, 384, 619.06
Kansas.....	1, 750, 210.79	977, 350.82	1, 142, 263.12	1, 086, 075.05	1, 310, 055.89	1, 130, 055.89	898, 026.58	1, 618, 955.93	1, 106, 053.57	1, 385, 947.88
Kentucky.....	494, 798.97	648, 566.19	513, 617.80	540, 708.48	536, 916.40	536, 932.92	606, 740.51	508, 135.47	501, 411.68	1, 064, 452.62
Louisiana.....	118, 440.26	105, 143.92	111, 415.71	132, 827.20	109, 613.16	267, 996.77	253, 101.16	1, 232, 229.45	531, 702.74	546, 727.92
Maine.....	151, 453.57	177, 867.99	191, 761.40	189, 802.43	129, 385.51	96, 772.69	109, 673.06	41, 780.54	118, 640.96	91, 226.34
Maryland, including District of Columbia.....	459, 830.13	444, 647.41	644, 124.06	524, 289.96	392, 467.85	377, 576.43	657, 885.31	1, 084, 642.97	381, 453.17	670, 710.39
Massachusetts.....	2, 252, 031.08	1, 128, 194.29	2, 452, 321.91	2, 031, 031.96	2, 106, 294.18	1, 732, 458.09	1, 510, 161.94	2, 094, 639.52	1, 172, 023.63	1, 213, 935.21
Michigan.....	509, 651.92	347, 908.64	352, 282.00	511, 027.83	645, 747.15	606, 127.71	622, 472.33	622, 622.75	480, 279.35	630, 952.95
Minnesota.....	3, 077, 924.51	1, 971, 190.85	2, 653, 326.20	2, 985, 443.42	2, 217, 441.28	2, 360, 379.21	2, 308, 069.41	2, 406, 529.72	2, 985, 460.03	2, 333, 332.25
Mississippi.....	51, 889.29	46, 625.84	87, 195.19	36, 688.53	48, 949.57	56, 588.65	63, 001.66	37, 712.86	19, 637.19	113, 011.94
Missouri.....	2, 718, 549.83	1, 436, 278.49	1, 281, 083.20	2, 015, 424.22	2, 265, 932.43	1, 817, 226.83	1, 523, 646.33	1, 643, 127.57	1, 552, 778.30	2, 097, 561.29
Montana.....	275, 568.25	68, 862.53	193, 628.51	154, 511.48	192, 190.47	164, 343.79	173, 695.31	215, 928.96	217, 887.58	245, 688.88
Nebraska.....	512, 553.38	500, 972.55	502, 747.50	792, 173.89	222, 228.15	657, 554.23	442, 056.34	493, 387.51	370, 218.60	661, 990.16
Nevada.....	4, 179.41	3, 606.45	3, 044.15	5, 899.23	2, 185.16	9, 086.11	15, 539.81	3, 673.83	3, 874.82	3, 035.31
New Hampshire.....	173, 044.36	171, 832.30	198, 372.88	321, 037.03	334, 038.66	163, 966.88	29, 424.10	142, 447.22	109, 895.90	115, 878.70
New Jersey.....	382, 339.35	250, 951.93	250, 768.46	504, 734.60	343, 933.32	288, 764.14	351, 823.87	302, 906.96	186, 894.49	558, 027.91
New Mexico.....	6, 002.61	7, 842.75	8, 661.46	10, 362.32	6, 550.11	14, 067.80	5, 293.46	7, 790.44	7, 790.44	30, 409.31
New York.....	3, 003, 336.61	2, 444, 877.02	3, 717, 700.71	3, 466, 097.40	3, 645, 733.73	2, 647, 411.55	3, 562, 821.87	9, 321, 702.70	5, 273, 990.82	5, 827, 260.86

EXHIBIT 2

Summary statement of processing and related taxes collected (gross)—All commodities through Dec. 31, 1934, as reported by the Bureau of Internal Revenue—Analyzed by State and month—Continued

State	March 1934	April 1934	May 1934	June 1934	July 1934	August 1934	September 1934	October 1934	November 1934	December 1934
North Carolina.....	\$2,336,964.21	\$3,126,601.80	\$3,255,423.59	\$2,218,354.42	\$3,024,613.84	\$2,490,691.83	\$2,998,001.05	\$2,831,159.80	\$2,945,229.27	\$3,772,944.64
North Dakota.....	62,484.32	70,846.10	89,455.84	97,041.77	126,662.90	97,331.11	94,742.95	105,493.71	119,520.28	37,370.76
Ohio.....	1,518,657.21	1,269,483.70	1,494,897.30	1,417,572.94	1,711,787.43	1,339,487.30	1,038,564.02	1,373,619.40	1,434,945.80	1,113,814.17
Oklahoma.....	443,392.14	279,814.60	339,861.76	344,906.46	339,247.86	325,018.90	303,621.11	368,869.25	377,518.17	393,705.18
Oregon.....	327,605.49	199,946.10	252,816.08	264,317.21	297,169.41	165,470.78	322,928.06	401,460.10	336,618.16	369,465.64
Pennsylvania.....	706,006.04	806,600.73	892,900.11	1,390,991.57	1,122,249.82	1,019,280.63	1,385,998.57	3,222,582.73	1,254,044.29	1,894,984.96
Rhode Island.....	281,182.78	128,401.00	254,923.59	310,535.14	310,795.30	141,943.95	229,119.05	49,886.16	130,015.88	125,063.38
South Carolina.....	1,415,924.94	2,008,152.40	1,603,401.24	1,830,310.51	1,912,782.02	1,302,225.23	1,070,411.39	1,577,257.28	1,208,107.67	1,549,262.12
South Dakota.....	41,623.93	35,909.88	41,070.83	50,277.26	38,657.49	41,786.09	58,694.57	45,231.45	9,886.93	62,658.91
Tennessee.....	603,621.74	506,238.02	602,931.42	696,828.24	526,825.58	433,483.76	444,583.25	471,035.20	448,501.63	836,669.52
Texas.....	1,011,002.63	930,559.88	1,180,443.19	727,865.08	1,120,402.18	964,975.28	877,441.78	1,589,642.27	918,612.36	1,446,961.09
Utah.....	49,275.54	39,002.81	47,281.18	46,249.15	101,472.09	126,557.88	252,399.46	199,620.69	331,860.79	73,704.75
Vermont.....	19,269.30	57,422.07	34,587.68	33,211.54	26,225.23	7,552.52	12,682.91	21,873.91	9,331.40	18,014.00
Virginia.....	431,299.24	807,329.53	783,890.41	261,522.84	1,035,050.83	637,212.42	629,749.10	516,627.50	622,324.54	1,493,468.88
Washington, including Alaska.....	336,044.90	349,877.49	746,358.98	268,719.29	523,408.88	332,856.70	217,438.49	361,825.79	679,191.83	491,039.61
West Virginia.....	91,708.35	53,152.97	109,225.29	87,017.43	85,920.00	75,042.96	76,153.02	72,638.08	82,191.53	91,216.11
Wisconsin.....	309,204.13	487,157.83	285,437.41	386,078.44	506,406.64	513,056.19	506,605.00	256,633.91	508,010.33	917,285.94
Wyoming.....	13,974.99	17,517.81	17,766.00	24,941.07	15,396.47	22,563.63	20,629.89	20,582.29	18,282.88	21,821.53
Total.....	36,180,614.70	33,330,865.23	43,292,452.97	43,043,375.99	43,013,496.05	39,906,447.07	40,283,314.11	54,800,103.33	44,600,740.19	46,774,416.93

EXHIBIT 3

Processing and related taxes collected (gross) to Dec. 31, 1934, as reported by the Bureau of Internal Revenue—Classified by State and commodity

State	Total	Wheat	Cotton	Tobacco	Field corn	Hogs
Alabama.....	\$12,021,810.75	\$122,762.41	\$11,085,565.58	\$25,547.42	\$125,352.41	\$307,627.75
Arizona.....	512,768.72	266,046.21	42,205.66	2,466.92	2,265.65	187,945.00
Arkansas.....	723,617.32	120,465.14	429,121.70	16,369.84	50,061.94	67,121.65
California.....	21,957,627.33	8,108,099.32	2,556,837.30	669,844.49	31,287.44	3,131,059.45
Colorado.....	7,767,410.69	3,596,019.06	387,940.66	12,463.54	5,221.31	601,879.21
Connecticut.....	2,633,432.97	109,118.53	1,994,861.78	38,841.05	2,290.72	475,555.49
Delaware.....	719,492.55	123,632.14	167,086.77	86,874.69	6,116.04	315,510.59
Florida.....	990,715.93	81,888.00	145,013.30	506,716.56	9,731.06	96,647.62
Georgia.....	28,007,359.71	1,021,355.53	24,619,884.93	39,933.69	190,043.43	589,346.39
Hawaii.....	704,015.89	26,573.49	112,559.77	8,800.08	278.30	61,312.47
Idaho.....	747,150.64	408,385.79	54,783.82	3,367.64	1,483.00	256,177.89
Illinois.....	106,858,350.07	12,138,588.28	4,772,322.42	719,375.96	1,179,436.72	87,263,935.91
Indiana.....	11,014,821.02	4,087,007.30	763,643.25	158,020.93	534,087.03	5,351,569.85
Iowa.....	20,123,164.35	812,795.89	402,072.51	36,849.02	883,689.63	17,878,334.50
Kansas.....	19,700,093.92	18,211,925.07	433,612.36	13,151.76	29,881.51	885,705.63
Kentucky.....	8,174,672.52	2,521,873.78	809,444.02	2,975,181.64	365,301.58	1,134,141.79
Louisiana.....	4,459,268.54	135,847.25	1,216,822.18	59,733.38	73,681.01	101,012.96
Maine.....	2,719,691.56	73,163.04	2,402,982.54	10,988.59	1,557.84	120,727.17
Maryland, including District of Columbia.....	8,129,837.18	953,104.78	2,737,561.32	117,701.93	21,313.18	2,448,582.06
Massachusetts.....	31,411,283.81	494,854.17	26,242,675.55	94,702.61	24,376.08	3,282,035.45
Michigan.....	7,633,765.63	3,392,180.73	1,093,711.03	525,904.46	209,623.44	1,697,149.17
Minnesota.....	39,833,026.98	34,279,649.09	574,793.65	50,077.29	27,331.12	4,490,742.36
Mississippi.....	1,149,406.29	91,408.99	933,428.69	14,885.49	32,732.13	25,995.11
Missouri.....	28,044,198.51	15,446,081.79	3,438,244.52	989,539.24	302,700.78	6,544,120.98
Montana.....	2,872,907.87	2,509,212.18	65,116.86	6,242.27	3,072.65	272,787.84
Nebraska.....	7,380,777.95	5,034,416.32	218,136.25	12,465.82	119,496.57	1,952,657.76
Nevada.....	166,906.35	89,144.14	8,871.20	8,505.87	2,846.88	41,072.92
New Hampshire.....	2,719,230.86	165,807.69	2,360,583.24	62,750.97	1,478.08	12,004.25
New Jersey.....	5,798,246.98	523,030.86	1,944,744.07	1,379,952.82	11,892.15	1,863,825.37
New Mexico.....	207,508.14	104,677.87	42,114.16	3,191.54	1,517.67	34,083.88
New York.....	69,306,272.06	19,308,498.18	17,802,682.51	7,342,480.10	2,787,246.46	8,082,058.23
North Carolina.....	47,935,773.30	2,042,499.53	35,197,551.17	9,923,500.88	66,469.32	141,630.00
North Dakota.....	1,628,189.33	1,418,559.55	68,388.10	2,116.06	1,040.26	126,995.75
Ohio.....	21,483,283.41	7,604,669.43	2,464,525.62	1,884,357.42	111,874.88	8,713,700.27
Oklahoma.....	5,666,101.87	4,505,934.97	551,299.90	15,097.35	80,867.29	462,271.08
Oregon.....	4,496,738.03	3,713,425.95	168,824.04	10,285.94	3,583.91	495,443.95
Pennsylvania.....	20,204,178.92	4,104,683.06	3,568,132.24	1,892,547.88	165,125.21	6,017,487.75
Rhode Island.....	4,481,580.07	56,010.25	4,244,191.77	12,487.21	5,646.59	158,150.81
South Carolina.....	25,917,153.08	159,001.51	25,265,031.50	33,758.17	34,806.09	189,505.48
South Dakota.....	706,840.59	350,250.58	72,038.05	4,281.70	2,201.25	267,735.83
Tennessee.....	9,001,499.10	2,567,052.26	3,469,622.42	766,152.58	164,593.99	1,603,055.09
Texas.....	16,998,970.32	11,332,635.72	3,266,802.23	78,809.49	186,796.06	1,070,752.74
Utah.....	1,503,506.66	373,313.17	105,981.03	3,503.39	1,310.54	192,886.53
Vermont.....	419,092.67	59,932.76	200,826.37	3,832.73	595.85	36,453.39
Virginia.....	10,921,820.25	2,199,460.67	3,532,992.08	3,193,156.59	69,156.22	633,651.34
Washington, including Alaska.....	6,646,848.98	5,085,572.79	294,915.70	18,500.30	24,041.69	1,115,659.27
West Virginia.....	1,579,025.25	469,268.71	372,164.23	388,190.23	31,271.12	165,203.60
Wisconsin.....	6,470,102.94	713,672.68	650,948.86	65,523.87	194,672.27	4,576,456.90
Wyoming.....	321,865.46	215,093.02	24,605.41	2,392.69	667.28	76,246.86
Total.....	640,871,403.32	181,328,649.63	193,478,174.32	34,291,422.09	8,152,113.63	175,616,013.35

State	Paper and jute	Sugar	Peanuts	Cotton ginning	Tobacco producers' sales	Unclas- sified
Alabama.....	\$24,896.96	\$79,893.11	\$36,230.97	\$5,089.53		\$208,844.61
Arizona.....	2,055.72	9,028.80		743.99		10.77
Arkansas.....	8,978.25	13,152.53		10,342.54		8,003.73
California.....	1,015,340.88	6,443,429.73	111.98	757.84		858.90
Colorado.....	183,081.75	2,970,422.00				10,383.16
Connecticut.....	6,269.52	5,013.78				1,482.10
Delaware.....	19,078.34	1,193.98				
Florida.....	45,649.56	62,615.78	11,595.74	24,625.56	\$2,457.30	3,775.45
Georgia.....	304,335.02	1,062,000.36	80,301.81	2,174.64	13,835.58	84,148.33
Hawaii.....	467,451.12	26,559.41	420.12			61.13
Idaho.....	19,241.98	3,080.93				629.59
Illinois.....	540,092.93	195,509.69		1,760.50		47,417.66
Indiana.....	35,866.92	68,600.30			15,097.36	928.08
Iowa.....	33,648.23	65,423.34				10,351.23
Kansas.....	63,451.43	57,696.12				4,670.04
Kentucky.....	38,597.24	23,876.98			295,842.61	10,412.88
Louisiana.....	299,179.03	2,541,187.28		31,673.14		132.31
Maine.....	102,834.27	7,438.11				

EXHIBIT 3

Processing and related taxes collected (gross) to Dec. 31, 1934, as reported by the Bureau of Internal Revenue—Classified by State and commodity—Continued

State	Paper and jute	Sugar	Peanuts	Cotton ginning	Tobacco producers' sales	Unclassified
Maryland, including District of Columbia	619,092.35	1,205,858.60	65.89			26,557.07
Massachusetts	404,263.57	802,817.08	3.84			65,555.46
Michigan	101,053.34	518,728.15	2.82			95,412.49
Minnesota	218,640.57	91,632.07				160.83
Mississippi	4,197.62	9,903.70		3,214.09		33,640.47
Missouri	1,266,248.25	55,467.80		809.62	20.00	965.53
Montana	9,865.65	6,277.98				332.44
Nebraska	23,285.96	20,302.20				17.07
Nevada		16,465.34				
New Hampshire	114,467.15	2,031.23				108.24
New Jersey	60,363.45	14,300.54				137.72
New Mexico	1,506.12	7,620.78	591.37	11,364.36		840.39
New York	2,762,237.03	11,220,781.19	235.26			53.10
North Carolina	49,888.52	24,443.49	863.40	192.90	373,800.06	115,339.83
North Dakota	7,341.84	3,642.96				104.81
Ohio	536,996.00	136,158.98			9,380.52	21,620.29
Oklahoma	20,775.27	29,833.96		22.05		
Oregon	84,427.51	19,991.83				754.90
Pennsylvania	430,651.51	4,025,500.88	1.05			49.34
Rhode Island	2,552.06	2,541.38				
South Carolina	13,467.84	100,792.49		4,632.20	16,284.53	99,873.27
South Dakota	3,499.72	6,529.86				303.60
Tennessee	235,168.10	22,534.28		11,637.97	124,377.78	37,304.63
Texas	190,130.69	616,880.44	24,636.97	11,330.33		220,195.65
Utah	31,113.20	795,398.80				
Vermont	115,641.09	1,802.75				7.73
Virginia	448,081.52	356,834.41	275,798.65	1,520.49	205,588.81	5,579.47
Washington, including Alaska	47,413.88	60,684.82	57.87			2.66
West Virginia	132,017.87	11,666.07			8,328.50	914.92
Wisconsin	189,831.04	62,048.73				16,948.59
Wyoming	735.37	1,861.52				283.31
Total	11,334,983.24	33,887,456.54	430,917.74	121,505.95	1,065,013.05	1,135,153.78

EXHIBIT 4

Tax refunds to Dec. 31, 1934, as reported by the Bureau of Internal Revenue—Classified by State and commodity

State	Total	Cotton	Wheat	To- bacco	Corn	Hogs	Paper and jute	Sugar
Alabama	\$19,431.39	\$12,055.50	\$6,595.52	\$9.10	\$658.52	\$81.57	\$9.78	\$21.40
Arizona	7,383.91	192.18	7,151.99		39.74			
Arkansas	1,255.68	436.39	342.94	107.22	355.24	4.61	9.28	
California	802,433.38	70,082.80	722,929.75	457.89	1,368.40	937.16	6,657.38	
Colorado	11,767.06	8,282.33	2,997.93	27.03	165.18	77.38	73.91	143.30
Connecticut	23,988.96	13,708.23	13,172.71	12.65	6.00	2,052.39	36.98	
Delaware	1,047.82	1,047.82						
Florida	2,038.41	1,389.61	192.46	7.36	3.70	445.28		
Georgia	55,056.17	48,995.64	5,645.34	13.49	279.79	86.42	35.49	
Hawaii	503.50	363.30		61.48	19.80	22.31	36.61	
Idaho	1,063.40	382.06	188.00	18.52	162.73	86.01	226.08	
Illinois	5,761,743.91	76,007.36	84,958.84	70.78	17,558.43	5,575,619.14	7,529.36	
Indiana	181,458.17	11,685.02	36,684.31	263.61	453.80	132,038.32	279.07	54.04
Iowa	1,648,328.99	2,963.13	26,722.67	223.55	7,638.27	1,610,656.52	103.45	21.40
Kansas	147,929.48	3,959.02	106,894.51	67.28	457.06	36,405.01	146.60	
Kentucky	24,611.06	1,178.82	21,456.32	160.72	111.06	1,701.14	3.00	
Louisiana	72,116.88	40,924.20	15,893.73	17.43		15,166.79	114.73	
Maine	1,678.80	401.79	284.55	37.34	186.06	93.25	675.81	
Maryland	4,140,414.97	158,552.61	1,051,386.97	50.55	5.95	2,930,003.21	415.68	
Massachusetts	631,191.03	374,570.57	3,338.60	107.99	1,353.55	251,386.38	433.94	
Michigan	107,640.21	13,637.66	89,541.70	165.04	403.38	3,547.53	344.90	
Minnesota	393,277.14	13,298.67	161,399.64	15.29	660.22	217,590.35	218.38	94.59
Mississippi	3,527.07	2,551.05	887.92	65.45	7.12	15.53		
Missouri	89,196.67	7,437.35	80,167.05	92.68	675.97	520.90	302.72	
Montana	5,044.24	732.51	3,809.42	63.21	180.00	250.39	8.71	
Nebraska	51,798.94	2,374.68	3,980.19	8.30	139.36	45,210.32	86.09	
Nevada	61.26	17.47		43.79				
New Hampshire	30,553.00	30,402.02	43.19	.56	34.35	36.31	36.57	

*Tax refunds to Dec. 31, 1934, as reported by the Bureau of Internal Revenue—
Classified by State and commodity—Continued*

State	Total	Cotton	Wheat	To- bacco	Corn	Hogs	Paper and jute	Sugar
New Jersey.....	\$40,053.91	\$29,819.27	\$3,822.66	\$4.34	\$4,113.32	\$2,149.15	\$125.17	-----
New Mexico.....	1,478.53	81.01	1,374.83	-----	22.69	-----	-----	-----
New York.....	2,227,808.88	1,541,494.64	160,214.85	767.22	64,346.90	445,747.20	15,238.07	-----
North Carolina.....	114,536.49	111,184.24	2,066.65	-----	1,035.42	-----	250.18	-----
North Dakota.....	1,403.84	237.57	1,091.26	5.75	-----	13.59	55.67	-----
Ohio.....	313,032.07	71,598.17	99,840.68	117.34	1,072.16	140,043.81	342.32	\$17.59
Oklahoma.....	31,708.59	848.43	26,686.74	23.27	129.42	4,005.61	15.12	-----
Oregon.....	197,806.42	905.70	196,715.09	7.24	85.06	71.94	21.39	-----
Pennsylvania.....	178,704.50	137,496.55	28,187.79	190.48	4,411.33	7,208.63	1,115.56	94.16
Rhode Island.....	15,378.31	15,218.71	114.50	1.77	39.21	-----	4.12	-----
South Carolina.....	26,556.93	25,289.26	662.31	300.87	171.08	-----	133.41	-----
South Dakota.....	1,917.16	121.55	1,795.61	-----	-----	-----	-----	-----
Tennessee.....	62,275.51	37,401.75	23,823.48	29.41	570.07	199.57	251.23	-----
Texas.....	109,766.78	12,398.92	95,154.93	262.82	1,030.67	591.15	328.29	-----
Utah.....	203.52	187.56	15.96	-----	-----	-----	-----	-----
Vermont.....	473.65	349.55	121.72	-----	2.38	-----	-----	-----
Virginia.....	115,266.82	33,789.62	3,341.61	103.51	545.94	67,370.87	10,084.88	30.39
Washington.....	411,422.50	11,585.38	397,244.75	197.30	189.45	744.23	1,461.39	-----
West Virginia.....	5,220.67	4,613.43	245.82	200.84	74.87	85.71	-----	-----
Wisconsin.....	421,827.97	6,732.11	41,847.80	72.92	1,707.42	370,922.44	331.28	214.00
Wyoming.....	1,458.29	16.67	1,441.62	-----	-----	-----	-----	-----
Total.....	18,499,822.84	2,938,999.88	3,532,476.91	4,453.39	112,471.07	11,863,188.12	47,542.60	690.87

EXHIBIT 5

*Tax collections due United States possessions through Dec. 31, 1934, as reported by
the Bureau of Internal Revenue—Analyzed by commodity and possession ¹*

Commodity	Total	Puerto Rico	Hawaii	Philippine Islands	Virgin Islands	Ameri- can Samoa	Island of Guam	Canal Zone
Import compensat- ing taxes:								
Wheat.....	\$22.46	-----	-----	\$22.46	-----	-----	-----	-----
Cotton.....	101,988.54	-----	-----	101,970.94	\$11.41	-----	-----	\$6.19
Tobacco.....	259,188.92	-----	-----	236,510.82	56.67	\$1,569.99	\$10.33	21,041.11
Field corn.....	119.76	-----	-----	65.05	-----	5.82	41.66	7.23
Hogs.....	1.48	-----	-----	1.48	-----	-----	-----	-----
Paper and jute.....	93,877.89	-----	-----	93,238.23	576.97	38.01	-----	24.68
Sugar.....	39,563.29	-----	-----	39,536.39	26.90	-----	-----	-----
Peanuts.....	3.93	-----	-----	3.93	-----	-----	-----	-----
Tax under sugar amendment.....	494,766.27	-----	-----	471,349.30	671.95	1,613.82	51.99	21,079.21
Total.....	6,531,408.12	\$3,366,779.91	\$15,021.46	3,116,997.79	32,608.96	-----	-----	-----
Total.....	7,026,174.39	3,366,779.91	15,021.46	3,588,347.09	33,280.91	1,613.82	51.99	21,079.21

¹ These tax receipts are segregated in funds to be used for the benefit of agriculture in island possessions of the United States.

APPENDIX C—RENTAL AND BENEFIT PAYMENTS ACTUALLY DISBURSED

EXHIBIT 6

Summary statement of rental and benefit payments—all commodities through Dec. 31, 1934—analyzed by State and month

State	Total	July 1933	August 1933	September 1933	October 1933	November 1933	December 1933
Alabama	\$18,305,690.64		\$12,043.55	\$4,113,873.87	\$4,766,182.92	\$492,097.68	\$152,809.23
Arizona	987,399.41			66,397.00	153,277.96	32,461.00	16,058.20
Arkansas	20,281,307.23		105,655.04	3,699,078.13	5,271,162.39	1,129,909.64	461,793.62
California	3,537,661.44			12,001.00	125,463.67	19,287.00	85,601.80
Colorado	4,337,779.31						267,418.40
Connecticut	844,634.44				108,659.34	25,065.95	36,032.70
Delaware	173,983.76						66,431.40
Florida	878,977.86		9,936.00	155,572.00	114,810.20	9,003.09	33,834.85
Georgia	17,650,740.11		7,382.00	2,942,839.45	4,221,802.07	556,279.01	197,918.34
Idaho	5,544,153.19						12,380.80
Illinois	22,812,945.26				156.00	28,721.20	620,690.64
Indiana	16,799,710.26					323,806.06	632,927.16
Iowa	40,040,805.88					90,034.60	91,061.80
Kansas	45,380,040.52				2,475.00	804,876.60	6,632,759.41
Kentucky	5,213,926.68				33,375.00	11,935.40	108,115.40
Louisiana	10,116,560.87			1,831,342.97	2,672,551.00	368,616.61	97,332.36
Maine	2,006.00						
Maryland	1,567,166.69					233,315.90	265,409.40
Massachusetts	547,826.97				56,344.50	8,409.80	13,558.80
Michigan	2,729,252.10					23,225.00	342,525.80
Minnesota	13,099,480.93					54,766.60	474,915.71
Mississippi	19,769,666.47		7,092.66	2,505,451.17	5,726,543.79	1,116,853.64	568,896.31
Missouri	18,808,231.46		12,802.00	665,418.57	947,430.86	337,996.02	586,635.77
Montana	9,265,512.77						
Nebraska	24,509,066.25					102,427.44	909,489.73
Nevada	69,960.81						15,988.80
New Hampshire	25,377.50				906.50	246.80	600.90
New Jersey	182,543.69						6,147.60
New Mexico	1,828,026.01			99,149.00	217,986.50	33,042.40	177,554.44
New York	236,140.14					19,742.18	11,066.45
North Carolina	13,141,978.98		78,903.85	840,644.45	1,671,428.80	168,808.42	70,131.20
North Dakota	24,415,874.23						
Ohio	12,675,393.30				75,504.92	249,735.36	869,363.10
Oklahoma	31,300,311.05		4,414.20	6,129,734.25	4,442,796.12	804,771.49	1,363,805.20
Oregon	4,246,515.29						60,961.80
Pennsylvania	1,618,841.17				217,066.48	78,895.55	122,919.60
Puerto Rico	1,188,639.00						
Rhode Island	2,176.84						
South Carolina	12,432,993.10		123,507.50	1,818,136.37	2,422,830.74	253,444.95	67,010.63
South Dakota	14,997,981.97					24,772.60	674,953.00
Tennessee	8,639,072.29		96,350.57	1,084,908.01	1,720,486.80	283,964.66	171,737.55
Texas	80,341,652.08	\$517.00	312,973.25	23,303,095.13	16,200,516.61	2,407,969.25	2,355,806.13
Utah	1,096,736.73						243,930.80
Vermont	40,966.80				1,382.00	35.35	967.10
Virginia	2,675,421.02			27,868.00	91,479.56	276,991.98	63,673.58
Washington	6,462,548.41						16,091.60
West Virginia	299,518.42					12,921.40	30,244.00
Wisconsin	5,052,513.95		924.60		119,663.70	128,387.95	110,797.19
Wyoming	826,086.64						4,025.60
Total	527,501,795.92	517.00	771,985.22	49,295,509.37	51,382,283.43	10,512,818.58	19,113,373.90

State	January 1934	February 1934	March 1934	April 1934	May 1934	June 1934
Alabama	\$47,785.29	\$15,709.01	\$9,245.66	\$2,498.76	\$1,009,840.69	\$2,073,259.86
Arizona	11,326.40	1,136.40	1,376.60	387.10	20.00	132,270.86
Arkansas	107,835.65	36,455.85	17,736.04	4,419.52	789,776.69	2,168,577.23
California	459,279.29	126,566.82	113,228.33	34,425.69	302,358.14	50,466.56
Colorado	873,218.28	180,039.44	111,827.38	39,559.56	21,344.75	21,704.41
Connecticut	18,339.60	8,348.50	2,173.15	199.70	17,726.34	10,898.43
Delaware	1,108.95	6,081.60	2,179.05	1,268.96		668.83
Florida	1,632.60	302.00	42.00	90,995.43	21,437.42	72,150.34
Georgia	41,772.25	21,619.57	15,274.18	773,134.01	2,123,381.68	1,305,873.95
Idaho	1,593,287.40	486,039.39	192,817.23	61,881.98	29,089.02	11,906.55
Illinois	862,423.59	82,171.30	99,061.47	39,388.21	19,223.25	15,787.48
Indiana	256,266.34	67,171.25	43,995.90	17,355.62	8,794.15	91,076.85
Iowa	79,736.43	23,059.90	10,321.87	45,456.36	1,944,461.48	3,013,276.33
Kansas	7,220,689.32	1,330,731.01	610,209.47	214,615.07	133,152.93	114,171.34
Kentucky	50,500.37	4,869.47	6,829.65	2,466.43	726,604.76	1,198,716.54
Louisiana	24,900.05	7,557.62	2,877.81	604.00	643,311.48	1,121,933.05
Maryland	28,711.35	20,784.13	7,275.73	3,045.14	25,982.49	14,078.01
Massachusetts	14,064.00	3,385.20	537.30	168.80	6,611.44	2,705.90
Michigan	155,465.20	40,215.71	15,312.73	10,862.13	5,146.80	2,056.61
Minnesota	537,251.94	146,561.93	69,091.58	29,078.37	61,942.29	953,043.09
Mississippi	134,494.69	22,248.01	15,024.75	2,248.00	480,118.72	2,810,566.18
Missouri	247,661.84	64,822.25	45,353.13	16,950.48	34,282.43	1,099,062.78

*Summary statement of rental and benefit payments—all commodities through Dec.
31, 1934—analyzed by State and month—Continued*

State	January 1934	February 1934	March 1934	April 1934	May 1934	June 1934
Montana.....	882,578.50	2,326,927.45	471,480.97	557,295.36	109,516.20	63,662.79
Nebraska.....	2,421,213.97	287,230.00	241,077.57	79,306.81	45,474.13	44,148.57
Nevada.....	593.10	4,019.00	81.40	156.00		14,932.30
New Hampshire.....	534.40				95.36	
New Jersey.....	1,234.34	226.40	412.07		68.40	170.30
New Mexico.....	157,659.92	12,311.76	7,827.14	3,659.29	63,525.65	148,962.18
New York.....	18,163.50	3,691.02	1,664.60	1,478.88	1,187.97	289.20
North Carolina.....	18,639.53	11,578.20	1,802.90	1,544,114.56	2,613,809.33	1,829,098.19
North Dakota.....	959,374.97	5,416,834.38	2,916,565.01	519,355.93	197,332.57	151,309.04
Ohio.....	207,971.55	53,092.01	36,247.57	13,128.24	35,113.80	109,900.95
Oklahoma.....	2,055,268.50	1,296,666.16	245,972.42	75,848.58	26,631.66	513,664.99
Oregon.....	1,083,122.83	540,624.40	105,186.24	39,352.98	12,453.95	12,511.69
Pennsylvania.....	184,647.95	11,818.79	12,730.79	34,195.93	24,275.70	9,161.79
South Carolina.....	26,512.02	5,823.09	1,147.62	849,201.94	1,338,859.98	1,665,485.79
South Dakota.....	2,145,057.38	423,540.33	157,354.11	97,648.76	54,819.29	94,484.19
Tennessee.....	41,555.51	10,196.91	6,337.67	1,782.38	65,816.51	834,768.96
Texas.....	1,667,660.35	551,469.71	187,818.53	56,414.14	1,995,834.84	5,893,694.05
Utah.....	172,115.97	20,889.55	20,162.55	9,846.74	2,054.53	3,544.69
Vermont.....	219.60	120.90			108.38	
Virginia.....	36,598.55	10,803.60	6,815.92	317,279.69	165,090.07	126,137.86
Washington.....	2,791,792.06	808,600.67	300,436.91	62,866.66	23,814.51	96,756.13
West Virginia.....	3,144.20	3,921.82	1,654.40	857.60	30,291.20	10,425.57
Wisconsin.....	77,122.77	16,619.54	4,415.58	11,411.60	15,855.01	116,700.16
Wyoming.....	197,493.15	62,608.10	13,155.86	6,611.78	1,291.69	1,217.05
Total.....	27,918,025.45	14,576,036.15	6,132,138.84	5,677,823.17	15,227,887.68	28,025,277.62

State	July 1934	August 1934	September 1934	October 1934	November 1934	December 1934
Alabama.....	\$398,042.44	\$484,258.39	\$96,420.07	\$1,807,889.64	\$1,597,247.20	\$1,226,486.38
Arizona.....	44,034.81	112,326.26	14,573.89	64,703.30	298,894.13	38,195.50
Arkansas.....	521,965.55	702,692.85	351,712.83	1,625,341.88	1,937,549.60	1,349,644.72
California.....	95,558.16	767,169.67	211,553.60	234,023.28	566,436.34	333,242.09
Colorado.....	35,071.50	82,856.45	67,689.66	707,976.10	1,253,655.75	675,417.63
Connecticut.....	23,350.83	33,435.12	24,473.63	11,858.56	419,751.62	104,320.97
Delaware.....	147.40	848.55	12,969.65	16,388.41	56,151.57	9,739.39
Florida.....	12,833.90	103,255.75	52,513.31	89,779.01	69,707.48	41,172.48
Georgia.....	523,386.56	249,895.40	233,806.35	1,516,830.04	1,657,883.50	1,257,161.75
Idaho.....	16,366.41	27,194.64	42,229.77	616,700.32	1,585,739.72	868,519.96
Illinois.....	50,282.50	1,038,721.63	5,990,497.68	9,690,562.66	2,290,277.65	1,984,980.00
Indiana.....	672,404.66	4,212,788.36	4,058,085.35	2,422,009.49	955,502.96	3,036,980.11
Iowa.....	1,606,363.77	8,380,093.56	12,828,659.43	3,657,782.59	999,330.35	7,271,167.41
Kansas.....	419,710.99	3,464,196.73	3,876,684.77	14,604,667.55	3,497,288.72	2,953,811.61
Kentucky.....	277,718.26	367,427.70	206,745.57	1,564,114.08	326,066.93	328,441.12
Louisiana.....	257,238.64	174,164.27	113,602.87	907,333.82	1,088,589.11	804,605.21
Maine.....					2,006.00	
Maryland.....	7,396.52	52,270.43	217,224.47	531,183.66	75,128.11	85,361.35
Massachusetts.....	1,735.77	150,376.37	18,390.93	26,530.18	239,326.38	5,681.60
Michigan.....	2,181.23	45,975.88	462,163.47	1,008,671.75	370,732.01	2,441,717.78
Minnesota.....	1,427,231.99	1,362,966.82	3,749,247.32	1,663,821.34	957,563.74	1,611,998.21
Mississippi.....	672,678.69	459,212.81	223,954.69	465,973.70	3,396,306.14	1,162,002.52
Missouri.....	2,335,740.20	4,093,960.25	3,491,915.76	1,467,098.85	1,221,589.41	2,139,510.86
Montana.....	81,075.72	142,377.67	116,020.87	1,992,639.47	1,883,691.47	638,246.30
Nebraska.....	1,008,079.74	4,836,276.84	4,771,663.67	5,117,357.14	2,200,930.76	2,444,390.48
Nevada.....	3,138.90	7,391.75	2,009.05	10,331.64	489.87	10,828.40
New Hampshire.....		1,507.73	7,994.76	1,199.45	7,038.00	5,253.60
New Jersey.....	656.71		98.96	116,391.18	23,061.52	34,076.21
New Mexico.....	9,833.17	78,416.20	50,502.20	336,333.09	270,846.64	160,416.43
New York.....	475.81	6,376.12	22,209.02	76,549.33	55,618.80	17,627.26
North Carolina.....	1,199,876.31	288,203.07	269,685.30	626,786.48	1,291,230.92	617,237.47
North Dakota.....	132,224.17	197,036.91	468,579.42	5,055,993.70	6,531,187.06	1,870,081.07
Ohio.....	1,939,840.84	4,864,696.29	679,930.18	676,555.47	820,021.50	2,044,291.52
Oklahoma.....	1,008,731.03	1,235,666.52	1,356,341.04	5,958,536.36	2,925,209.20	1,856,253.33
Oregon.....	9,322.76	5,537.49	29,898.64	855,965.63	666,273.93	825,302.95
Pennsylvania.....	6,252.16	37,263.52	39,946.93	184,641.72	571,591.97	83,432.29
Puerto Rico.....		1,158,051.50				30,587.50
Rhode Island.....		86.84		2,140.00		
South Carolina.....	264,544.05	187,742.78	110,914.66	1,163,898.01	1,251,915.83	882,017.14
South Dakota.....	165,277.74	3,120,970.29	1,938,958.05	1,582,793.44	3,015,614.43	1,501,738.36
Tennessee.....	729,623.40	413,915.15	685,167.03	1,021,386.76	949,058.94	522,015.48
Texas.....	2,821,997.07	2,062,589.01	1,800,251.79	5,549,306.23	9,253,128.08	3,920,610.91
Utah.....	18,589.73	36,300.41	34,671.60	330,824.08	141,188.13	62,617.95
Vermont.....		1,600.00	2,236.28	20,661.75	12,247.65	1,387.79
Virginia.....	153,752.90	579,251.44	121,157.48	255,405.26	201,068.26	242,046.87
Washington.....	87,850.60	144,127.66	56,482.34	47,151.55	1,179,363.90	847,213.82
West Virginia.....	17,466.67	36,031.81	24,563.01	42,472.06	46,981.18	38,543.50
Wisconsin.....	399,144.47	906,586.78	1,801,642.83	168,113.67	320,487.58	854,640.52
Wyoming.....	968.59	1,686.72	47,878.30	209,229.12	164,365.97	115,554.71
Total.....	19,460,163.32	46,715,728.39	50,783,918.48	76,103,902.80	58,644,836.01	47,159,570.51

EXHIBIT 7

Cotton rental and benefit payments through Dec. 31, 1934—Analyzed by State and month

State	Total	July 1933	August 1933	September 1933	October 1933	November 1933	December 1933
Alabama.....	\$18,081,799.81	-----	\$12,043.55	\$4,113,873.87	\$4,766,182.92	\$492,097.68	\$152,809.23
Arizona.....	932,205.81	-----	-----	66,397.00	153,277.96	32,461.00	6,246.00
Arkansas.....	19,701,782.02	-----	105,655.04	3,699,078.13	5,271,162.39	1,129,909.64	461,793.62
California.....	996,587.47	-----	-----	12,001.00	125,463.67	19,287.00	4,030.00
Florida.....	459,005.71	-----	9,936.00	124,482.85	114,426.50	9,003.09	2,201.65
Georgia.....	16,085,856.51	-----	7,382.00	2,932,443.85	4,221,502.37	556,279.01	187,223.04
Kansas.....	3,731.58	-----	-----	-----	2,475.00	-----	577.00
Kentucky.....	84,148.31	-----	-----	-----	33,375.00	8,356.00	134.00
Louisiana.....	10,037,379.97	-----	-----	1,831,342.97	2,672,551.00	368,616.61	97,332.36
Mississippi.....	19,738,751.87	-----	7,092.66	2,505,451.17	5,726,543.79	1,116,853.64	568,896.31
Missouri.....	3,051,182.27	-----	12,802.00	665,418.57	947,430.86	160,086.50	51,475.75
New Mexico.....	872,779.21	-----	-----	99,149.00	217,986.50	33,042.40	10,247.00
North Carolina.....	7,090,603.16	-----	78,903.85	840,644.45	1,671,428.80	162,953.82	54,714.40
Oklahoma.....	18,190,129.12	-----	4,414.20	6,129,734.25	4,442,796.12	804,771.49	213,941.40
South Carolina.....	10,395,156.52	-----	123,507.50	1,818,136.37	2,422,830.74	253,444.95	67,010.63
Tennessee.....	6,134,841.11	-----	96,350.57	1,084,908.01	1,720,486.80	283,964.66	105,096.15
Texas.....	70,311,496.05	\$517.00	312,973.25	23,303,095.13	16,200,516.61	2,407,969.25	745,575.39
Virginia.....	349,124.29	-----	-----	27,868.00	91,479.56	7,930.12	1,395.25
Total.....	202,546,560.79	517.00	771,060.62	49,254,024.62	50,801,916.59	7,847,026.86	2,730,699.18

State	January 1934	February 1934	March 1934	April 1934	May 1934	June 1934
Alabama.....	\$47,785.29	\$15,709.01	\$9,245.66	\$2,498.76	\$1,008,634.69	\$2,059,879.81
Arizona.....	9,154.00	-----	-----	-----	55.00	132,042.86
Arkansas.....	107,835.65	34,726.65	17,736.04	4,264.72	789,776.69	2,167,839.03
California.....	2,420.00	-----	3.00	600.00	295,925.68	39,616.93
Florida.....	1,185.00	302.00	42.00	39.00	4,873.60	62,295.68
Georgia.....	41,127.25	17,609.17	14,623.78	9,957.76	1,792,241.05	1,067,368.28
Kentucky.....	-----	-----	-----	-----	-----	19,331.20
Louisiana.....	24,900.05	7,557.62	2,877.81	604.00	643,311.48	1,121,933.05
Mississippi.....	134,494.69	22,248.01	15,024.75	2,248.00	480,118.72	2,810,566.18
Missouri.....	5,877.00	151.50	142.52	80.00	160.00	163,082.58
New Mexico.....	2,883.00	-----	388.00	240.00	62,047.28	147,627.81
North Carolina.....	10,919.93	5,004.25	967.70	598.07	108,534.47	820,813.66
Oklahoma.....	66,742.99	18,087.26	14,242.70	5,844.21	3,657.90	488,823.21
South Carolina.....	26,512.02	5,823.09	1,147.62	245.37	925,797.55	1,335,417.60
Tennessee.....	25,699.76	6,964.56	3,364.58	1,622.57	37,612.51	531,284.13
Texas.....	215,813.23	85,122.26	43,639.00	14,490.67	1,966,387.73	5,865,105.84
Virginia.....	1,023.00	253.00	49.00	22.67	21,637.96	35,803.35
Total.....	724,372.86	219,558.38	123,494.16	43,195.80	8,140,662.31	18,868,831.20

State	July 1934	August 1934	September 1934	October 1934	November 1934	December 1934
Alabama.....	\$357,674.09	\$351,609.85	\$93,074.72	\$1,795,878.96	\$1,595,213.70	\$1,207,588.02
Arizona.....	28,464.06	110,543.76	14,573.89	55,259.00	293,178.55	30,662.73
Arkansas.....	447,484.05	546,435.16	166,262.75	1,564,308.48	1,894,867.63	1,292,646.35
California.....	69,580.66	38,100.54	17,986.06	11,688.55	279,447.56	80,436.82
Florida.....	9,602.79	22,814.63	4,298.12	30,106.96	62,420.74	30,975.10
Georgia.....	467,423.74	230,938.79	136,469.18	1,505,283.04	1,647,090.42	1,250,893.78
Kansas.....	-----	-----	-----	-----	36.00	643.58
Kentucky.....	-----	3,254.56	1,856.38	-----	17,704.67	136.50
Louisiana.....	257,238.64	174,164.27	113,602.87	907,333.82	1,059,109.31	754,904.11
Mississippi.....	672,678.69	459,212.81	223,954.69	437,006.20	3,394,632.79	1,161,728.77
Missouri.....	382,697.60	82,524.63	29,513.55	18,642.98	421,517.08	109,739.15
New Mexico.....	6,987.57	22,873.59	5,477.16	4,039.79	188,242.50	71,547.61
North Carolina.....	898,907.86	190,666.67	49,426.08	428,215.01	1,199,298.20	568,605.94
Oklahoma.....	969,400.32	1,069,379.77	317,979.70	1,084,991.48	1,445,250.10	1,110,072.02
South Carolina.....	147,066.51	122,272.87	52,130.97	1,052,531.20	1,180,050.07	861,231.46
Tennessee.....	558,738.42	227,167.50	45,895.11	227,479.59	794,967.76	383,233.43
Texas.....	2,793,888.92	1,612,576.61	495,027.05	2,988,641.30	8,069,894.55	3,190,262.26
Virginia.....	4,376.31	41,410.44	3,715.20	213.60	71,701.38	40,245.45
Total.....	8,072,210.23	5,305,946.45	1,771,243.48	12,111,619.96	23,614,623.01	12,145,558.08

EXHIBIT 8

Wheat rental and benefit payments through Dec. 31, 1934—Analyzed by State and Month

State	Total	November 1933	December 1933	January 1934	February 1934
Arizona	\$27,549.60		\$9,812.20	\$2,172.40	\$1,136.40
Arkansas	2,462.51				1,729.20
California	1,551,179.84		82,571.80	456,859.29	126,566.82
Colorado	3,086,089.10		267,418.40	873,218.28	180,039.44
Delaware	155,059.47		66,431.40	1,108.95	6,081.60
Georgia	9,015.80				4,010.40
Idaho	4,975,165.19		12,380.80	1,593,287.40	486,039.39
Illinois	3,756,181.14	\$28,721.20	620,663.09	862,339.19	82,171.30
Indiana	2,895,857.25	322,911.56	632,471.46	256,086.59	67,717.25
Iowa	627,759.83	90,034.60	91,061.80	79,736.43	23,059.90
Kansas	37,834,690.29	804,876.60	6,632,182.41	7,220,689.32	1,330,731.01
Kentucky	324,066.86	3,579.40	107,981.40	50,500.37	4,869.47
Maryland	1,271,325.05	233,315.90	265,409.40	28,711.35	20,784.13
Michigan	1,205,298.95	23,225.00	342,525.80	155,465.20	40,215.71
Minnesota	2,769,522.19	54,766.60	463,079.20	531,027.04	142,405.01
Missouri	2,301,535.92	177,909.52	535,160.02	241,784.84	64,670.75
Montana	8,981,267.05			882,578.50	2,326,927.45
Nebraska	9,260,498.16	102,427.44	909,489.73	2,421,213.97	287,230.00
Nevada	42,873.17		15,988.80	593.10	4,019.00
New Jersey	17,476.96		6,147.60	1,234.34	226.40
New Mexico	749,225.08		167,307.44	154,776.92	12,311.76
New York	51,418.25	5,412.60	4,747.40	15,431.60	3,062.92
North Carolina	70,195.79	5,854.60	15,416.80	7,719.60	6,573.95
North Dakota	22,960,318.33			959,374.97	5,416,834.38
Ohio	2,464,252.81	134,501.40	819,887.60	165,570.30	50,114.21
Oklahoma	10,716,573.01		1,149,863.80	1,988,525.51	1,278,578.90
Oregon	3,880,348.65		60,961.80	1,083,122.83	540,624.40
Pennsylvania	362,632.68		98,705.60	70,365.00	4,491.49
South Dakota	7,796,311.04	24,772.60	674,953.00	2,145,057.38	423,540.33
Tennessee	161,327.12		66,641.40	15,855.75	3,232.35
Texas	7,825,667.71		1,610,230.74	1,451,847.12	466,347.45
Utah	988,989.78		243,930.80	172,115.97	20,889.55
Virginia	788,921.47	269,061.86	62,278.33	35,575.55	10,550.60
Washington	6,074,196.93		16,091.60	2,791,792.06	808,600.67
West Virginia	108,943.32	12,921.40	30,244.00	3,144.20	3,921.82
Wisconsin	56,559.52		16,441.00	5,551.15	3,582.80
Wyoming	599,198.05		4,025.60	197,493.15	62,608.10
Total	146,749,953.87	2,294,292.28	16,102,502.22	26,921,925.62	14,316,496.31

State	March 1934	April 1934	May 1934	June 1934	July 1934
Arizona	\$1,376.60	\$387.10	\$35.00	\$228.00	\$164.75
Arkansas		154.80		61.00	
California	113,225.33	33,825.69	6,432.46	10,849.63	6,735.34
Colorado	111,827.38	39,559.56	21,344.75	21,704.41	15,480.45
Delaware	2,179.05	1,268.96		668.83	147.40
Georgia	650.40	503.00			168.99
Idaho	192,817.23	61,881.98	29,089.02	11,906.55	16,366.41
Illinois	99,061.47	39,388.21	19,223.25	15,787.48	12,969.80
Indiana	43,995.90	17,355.62	6,634.15	4,600.42	10,046.94
Iowa	10,321.87	5,076.11	1,096.46	1,815.88	874.40
Kansas	610,209.47	214,615.07	133,152.93	113,325.34	91,093.66
Kentucky	6,829.65	2,466.43	2,310.36	1,359.82	3,744.98
Maryland	7,275.73	3,045.14	1,592.44	3,452.21	3,623.19
Michigan	15,312.73	10,862.13	4,466.80	2,056.61	2,181.23
Minnesota	66,661.38	28,728.97	15,473.14	7,923.94	15,400.82
Missouri	45,210.61	17,030.48	6,509.75	6,980.00	11,780.79
Montana	471,480.97	557,295.36	109,516.20	63,662.79	69,612.52
Nebraska	241,077.57	79,306.81	45,474.13	44,148.57	39,873.07
Nevada	81.40	156.00		296.30	
New Jersey	412.07		68.40	170.30	656.71
New Mexico	7,439.14	3,419.29	1,478.37	1,334.37	281.85
New York	1,664.60	285.88	152.00	70.80	475.81
North Carolina	835.20	636.60	208.80	214.03	615.45
North Dakota	2,916,565.01	519,355.93	197,332.57	151,309.04	132,224.17
Ohio	35,586.22	12,891.44	4,718.44	4,460.47	5,332.32
Oklahoma	231,729.72	70,004.37	22,973.76	24,841.78	39,330.71
Oregon	105,186.24	39,352.98	12,453.95	12,511.69	9,322.76
Pennsylvania	10,307.24	2,125.67	801.41	1,736.35	1,310.76
South Dakota	157,354.11	97,648.76	54,819.29	27,290.14	19,778.01
Tennessee	2,973.09	159.81	64.00	338.43	418.90
Texas	144,179.53	41,923.47	29,447.11	28,588.21	28,108.15
Utah	20,162.55	9,846.74	2,054.53	3,544.69	2,016.33
Virginia	6,766.92	3,257.43	1,319.43	2,050.84	4,437.63
Washington	300,436.91	62,866.66	23,814.51	21,258.13	23,213.96
West Virginia	1,654.40	857.60	357.10	88.30	96.40
Wisconsin	1,508.83	605.90	233.43	154.60	141.88
Wyoming	13,155.86	6,611.78	1,291.69	1,217.05	968.59
Total	5,997,512.38	1,984,757.73	755,939.63	592,007.00	568,995.13

Wheat rental and benefit payments through Dec. 31, 1934—Analyzed by State and Month—Continued

State	August 1934	September 1934	October 1934	November 1934	December 1934
Arizona.....	\$20. 50		\$5, 259. 71	\$735. 30	\$6, 221. 64
Arkansas.....				345. 80	171. 71
California.....	78, 050. 10	\$75, 802. 11	181, 353. 54	253, 450. 70	125, 457. 03
Colorado.....	8, 314. 66	6, 840. 59	64, 573. 71	956, 198. 46	519, 569. 01
Delaware.....	290. 40	85. 80	14, 606. 51	53, 575. 83	8, 614. 74
Georgia.....		453. 78	2, 577. 97		651. 26
Idaho.....	16, 132. 14	15, 548. 50	428, 729. 52	1, 295, 466. 14	815, 520. 11
Illinois.....	25, 201. 74	44, 404. 44	542, 766. 39	916, 521. 21	446, 962. 37
Indiana.....	47, 647. 05	79, 865. 96	645, 672. 52	476, 416. 79	284, 435. 04
Iowa.....	2, 816. 02	3, 834. 61	132, 062. 81	105, 257. 14	80, 711. 80
Kansas.....	257, 941. 58	877, 106. 94	13, 960, 273. 49	3, 170, 029. 62	2, 418, 462. 85
Kentucky.....	2, 905. 80	3, 682. 33	45, 432. 70	44, 051. 39	44, 352. 76
Maryland.....	8, 591. 00	71, 139. 47	498, 573. 92	56, 351. 34	69, 459. 83
Michigan.....	5, 319. 43	10, 990. 14	215, 214. 05	240, 207. 44	137, 256. 68
Minnesota.....	10, 922. 31	13, 069. 87	273, 109. 92	511, 724. 44	635, 229. 55
Missouri.....	24, 662. 17	75, 134. 57	646, 403. 40	313, 782. 18	134, 516. 84
Montana.....	83, 414. 84	50, 440. 08	1, 901, 795. 93	1, 843, 442. 85	621, 099. 56
Nebraska.....	72, 199. 88	124, 934. 13	2, 993, 098. 30	1, 377, 764. 49	522, 260. 07
Nevada.....		1, 495. 81	9, 655. 49	69. 97	10, 517. 30
New Jersey.....			3, 979. 62	1, 187. 32	3, 394. 20
New Mexico.....	1, 993. 61	8, 902. 93	265, 249. 95	50, 217. 22	74, 512. 23
New York.....	686. 65	1, 417. 81	9, 081. 03	2, 100. 91	6, 828. 24
North Carolina.....	847. 63	2, 541. 58	14, 977. 76	4, 118. 92	9, 634. 87
North Dakota.....	124, 510. 77	83, 165. 75	4, 329, 066. 21	6, 407, 933. 54	1, 722, 645. 99
Ohio.....	20, 570. 14	34, 681. 62	487, 400. 49	466, 452. 66	222, 085. 50
Oklahoma.....	74, 604. 84	175, 729. 98	3, 844, 478. 41	1, 281, 053. 16	534, 858. 07
Oregon.....	5, 537. 49	13, 003. 14	628, 076. 65	595, 176. 80	775, 017. 92
Pennsylvania.....	7, 110. 86	9, 547. 20	86, 334. 32	30, 320. 54	39, 476. 24
South Dakota.....	15, 330. 36	21, 875. 31	964, 367. 67	2, 636, 507. 91	533, 116. 17
Tennessee.....	1, 265. 02	2, 178. 09	38, 667. 00	15, 849. 77	13, 683. 51
Texas.....	35, 472. 72	269, 455. 33	2, 137, 592. 52	1, 033, 528. 50	548, 946. 86
Utah.....	3, 771. 21	12, 479. 03	316, 502. 66	132, 143. 10	49, 532. 62
Virginia.....	6, 545. 83	14, 246. 89	224, 289. 31	90, 714. 65	57, 826. 20
Washington.....	25, 407. 05	16, 252. 73	27, 514. 24	1, 167, 747. 48	789, 200. 93
West Virginia.....	560. 98	45. 80	12, 954. 12	25, 043. 37	17, 053. 83
Wisconsin.....	934. 38	293. 35	1, 868. 99	5, 276. 38	19, 966. 83
Wyoming.....	1, 686. 72	4, 859. 23	84, 897. 53	127, 673. 23	92, 709. 52
Total.....	971, 165. 88	2, 125, 504. 90	36, 038, 458. 36	25, 688, 436. 55	12, 391, 959. 88

EXHIBIT 9

Tobacco rental and benefit payments through Dec. 31, 1934—Analyzed by State and month

State	Total	August 1933	September 1933	October 1933	November 1933	December 1933
Alabama.....	\$1, 566. 00					
Arkansas.....	180. 00					
Connecticut.....	822, 350. 09			\$108, 659. 34	\$25, 065. 95	\$36, 032. 70
Florida.....	244, 923. 04		\$31, 089. 15	383. 70		31, 633. 20
Georgia.....	1, 480, 144. 68		10, 395. 60	299. 70		10, 695. 30
Illinois.....	888. 85			156. 00		27. 55
Indiana.....	80, 419. 80				894. 50	455. 70
Kansas.....	3, 725. 71					
Kentucky.....	2, 783, 875. 29					
Maryland.....	38, 510. 37					
Massachusetts.....	360, 319. 10			56, 344. 50	8, 409. 80	13, 558. 80
Minnesota.....	50, 161. 14					11, 836. 51
Missouri.....	55, 740. 42					
New Hampshire.....	7, 736. 20			906. 50	246. 80	600. 90
New York.....	57, 427. 21				14, 329. 58	6, 319. 05
North Carolina.....	5, 658, 055. 02					
Ohio.....	751, 703. 30			75, 504. 92	115, 233. 96	49, 475. 50
Pennsylvania.....	1, 006, 961. 39			217, 066. 48	78, 895. 55	24, 214. 00
Puerto Rico.....	1, 188, 639. 00					
South Carolina.....	1, 860, 774. 64					
Tennessee.....	701, 730. 42					
Vermont.....	9, 162. 63			1, 382. 00	35. 35	967. 10
Virginia.....	708, 250. 70					
West Virginia.....	36, 262. 76					
Wisconsin.....	1, 086, 156. 72	\$924. 60		119, 663. 70	128, 387. 95	94, 356. 19
Total.....	18, 995, 664. 48	924. 60	41, 484. 75	580, 366. 84	371, 499. 44	280, 172. 50

Tobacco rental and benefit payments through Dec. 31, 1934—Analyzed by State and month—Continued

State	January 1934	February 1934	March 1934	April 1934	May 1934	June 1934
Alabama.....					\$1,206.00	\$30.00
Arkansas.....						
Connecticut.....	\$18,339.60	\$8,348.50	\$2,173.15	\$199.70	17,726.34	10,898.43
Florida.....	447.60			90,956.43	16,563.82	9,854.66
Georgia.....	645.00			767,673.25	331,140.63	238,505.67
Illinois.....	84.40					
Indiana.....	179.75				2,160.00	42,425.83
Kansas.....						846.00
Kentucky.....					724,294.40	1,178,025.52
Maryland.....					24,390.05	7,989.80
Massachusetts.....	14,064.00	3,385.20	537.30	168.80	6,611.44	2,705.90
Minnesota.....	6,224.90	4,156.92	2,430.20	349.40	569.55	132.45
Missouri.....					2,704.00	28,866.00
New Hampshire.....	534.40				95.36	
New York.....	2,731.90	628.10		1,193.00	1,035.97	218.40
North Carolina.....				1,542,879.89	2,505,066.06	1,008,070.50
Ohio.....	42,401.25	2,977.80	661.35	236.80	30,395.36	76,813.43
Pennsylvania.....	114,282.95	7,327.30	2,423.55	32,070.26	23,474.29	7,425.44
Puerto Rico.....						
South Carolina.....				848,956.57	413,062.43	330,068.19
Tennessee.....					28,140.00	303,146.40
Vermont.....	219.60	120.90			108.38	
Virginia.....				313,999.59	142,132.63	86,053.32
West Virginia.....					29,934.10	1,360.96
Wisconsin.....	71,571.62	13,036.74	2,906.75	10,805.70	15,621.58	4,984.76
Total.....	271,726.97	39,981.46	11,132.30	3,609,489.39	4,316,432.44	3,338,421.66

State	July 1934	August 1934	September 1934	October 1934	November 1934	December 1934
Alabama.....	\$330.00					
Arkansas.....		\$180.00				
Connecticut.....	23,350.83	33,435.12	\$12,295.88	\$3,115.06	\$418,910.52	\$103,798.97
Florida.....	3,231.11	644.05	4,358.86	54,107.06	1,103.14	550.26
Georgia.....	55,793.83	17,671.06	28,524.32	8,899.03	7,095.88	2,805.41
Illinois.....					216.00	404.90
Indiana.....	21,682.07	4,448.18	638.20	2,161.24	4,572.55	801.78
Kansas.....	562.00	1,550.00	234.00	419.55	114.16	
Kentucky.....	273,973.28	360,957.88	105,914.75	62,163.41	44,031.53	34,514.52
Maryland.....	2,254.65	1,600.50	760.32	1,293.55	57.50	164.00
Massachusetts.....	1,735.77	1,400.37	8,433.98		237,720.74	5,242.50
Minnesota.....	1,733.45	374.56	52.20	4.80		22,296.20
Missouri.....	10,387.20	7,983.85	4,068.18	623.31	529.50	578.38
New Hampshire.....		39.73	170.61		3,224.30	1,917.60
New York.....		101.98	262.03		30,456.00	151.20
North Carolina.....	300,353.00	96,042.11	109,653.21	28,302.86	50,321.32	17,366.07
Ohio.....	46,781.60	36,742.09	5,208.24	5,793.10	202,173.42	61,304.48
Pennsylvania.....	4,941.40	30,152.66	3,569.83	2,194.97	448,031.71	10,891.00
Puerto Rico.....		1,158,051.50				30,587.50
South Carolina.....	117,477.54	65,469.91	40,778.49	25,582.33	13,723.83	5,655.35
Tennessee.....	170,466.08	122,540.86	20,272.84	18,077.10	19,122.67	19,964.47
Vermont.....					6,329.30	
Virginia.....	49,941.99	47,183.51	6,352.39	12,564.48	17,391.18	32,631.56
West Virginia.....	1,184.32	907.50	285.30	113.33	648.12	1,829.13
Wisconsin.....	5,655.70	37,788.11	11,725.80	4,944.23	185,013.35	378,769.94
Total.....	1,091,835.82	2,025,265.53	363,559.43	230,359.41	1,690,786.72	732,225.22

EXHIBIT 10

Corn-hog rental and benefit payments through Dec. 31, 1934—Analyzed by State and month

State	Total	April 1934	May 1934	June 1934	July 1934
Alabama.....	\$222,324.83			\$13,350.05	\$40,038.35
Arizona.....	27,644.00				15,406.00
Arkansas.....	576,882.70			677.20	74,481.50
California.....	989,894.13				19,242.16
Colorado.....	1,251,690.21				19,591.05
Connecticut.....	22,284.35				
Delaware.....	18,924.29				
Florida.....	145,049.11				
Georgia.....	75,723.12				
Idaho.....	568,988.00				
Illinois.....	19,055,875.27				37,312.70
Indiana.....	13,823,433.21			44,050.60	640,675.65
Iowa.....	39,413,046.05	\$40,380.25	\$1,943,365.02	3,011,460.45	1,605,489.37
Kansas.....	8,037,892.94				328,055.33
Kentucky.....	2,021,836.22				
Louisiana.....	32,431.60				
Maine.....	2,006.00				
Maryland.....	257,331.27			2,636.00	1,518.68
Massachusetts.....	187,507.87				
Michigan.....	1,523,953.15		680.00		
Minnesota.....	10,279,797.60		45,899.60	944,986.70	1,410,097.72
Mississippi.....	30,914.60				
Missouri.....	13,399,772.85		24,908.68	900,134.20	1,930,874.61
Montana.....	284,245.72				11,463.20
Nebraska.....	15,248,568.09				968,206.67
Nevada.....	27,087.64			14,636.00	3,138.90
New Hampshire.....	17,641.80				
New Jersey.....	165,066.73				
New Mexico.....	206,021.72				2,563.75
New York.....	127,294.68				
North Carolina.....	323,125.01				
North Dakota.....	1,455,555.90				
Ohio.....	9,459,437.19			23,627.05	1,887,726.92
Oklahoma.....	2,393,608.92				
Oregon.....	366,166.64				
Pennsylvania.....	249,247.10				
Rhode Island.....	2,176.84				
South Carolina.....	177,061.94				
South Dakota.....	7,201,670.93			67,194.05	145,499.73
Tennessee.....	1,641,173.64				
Texas.....	2,204,488.32				
Utah.....	98,954.95				16,573.40
Vermont.....	31,804.17				
Virginia.....	829,124.66			2,230.35	94,996.97
Washington.....	388,351.48			75,498.00	64,636.64
West Virginia.....	154,312.34			8,976.31	16,185.95
Wisconsin.....	3,909,797.71			111,560.80	393,346.89
Wyoming.....	226,888.59				
Total.....	159,154,075.48	40,380.25	2,014,853.30	5,226,017.76	9,727,122.14

Corn-hog rental and benefit payments through Dec. 31, 1934—Analyzed by State and month—Continued

State	August 1934	September 1934	October 1934	November 1934	December 1934
Alabama	\$132,648.54	\$3,345.35	\$12,010.68	\$2,033.50	\$18,898.36
Arizona	1,762.00		4,184.59	4,980.28	1,311.13
Arkansas	156,077.69	185,450.08	61,033.40	42,336.17	56,826.66
California	651,019.03	117,765.43	40,981.19	33,538.08	127,348.24
Colorado	74,541.79	60,849.07	643,402.39	297,457.29	155,848.62
Connecticut		12,177.75	8,743.50	841.10	522.00
Delaware	558.15	12,883.85	1,781.90	2,575.74	1,124.65
Florida	79,797.07	43,856.33	5,564.99	6,183.60	9,647.12
Georgia	1,285.55	68,359.07	70.00	3,197.20	2,811.30
Idaho	11,062.50	26,681.27	187,970.80	290,273.58	52,999.85
Illinois	1,013,519.89	5,946,093.24	9,147,796.27	1,373,540.44	1,537,612.73
Indiana	4,160,693.13	3,977,581.19	1,774,175.73	474,513.62	2,751,743.29
Iowa	8,377,277.54	12,824,824.82	3,525,719.78	894,073.21	7,190,455.61
Kansas	3,204,705.15	2,999,343.83	645,974.51	327,108.94	534,705.18
Kentucky	309.46	95,292.11	1,456,517.97	220,279.34	249,437.34
Louisiana				29,479.80	2,951.80
Maine				2,006.00	
Maryland	42,078.93	145,324.68	31,316.19	18,719.27	15,737.52
Massachusetts	148,976.00	9,956.95	26,530.18	1,605.64	439.10
Michigan	40,656.45	451,173.33	793,457.70	130,524.57	107,461.10
Minnesota	1,351,669.95	3,736,125.25	1,390,706.62	445,839.30	954,472.46
Mississippi			28,967.50	1,673.35	273.75
Missouri	3,978,789.60	3,383,199.46	801,429.16	485,760.65	1,894,676.49
Montana	58,962.83	65,580.79	90,843.54	40,248.62	17,146.74
Nebraska	4,764,076.96	4,646,728.94	2,124,258.84	823,166.27	1,922,130.41
Nevada	7,391.75	513.84	676.15	419.90	311.10
New Hampshire	1,468.00	7,824.15	1,199.45	3,813.70	3,336.00
New Jersey		98.96	112,411.56	21,874.20	30,682.01
New Mexico	53,549.00	36,122.11	67,043.35	32,386.92	14,356.59
New York	5,587.49	20,529.18	67,468.30	23,061.89	10,647.82
North Carolina	646.66	108,064.43	155,290.85	37,492.48	21,630.59
North Dakota	72,526.14	385,413.67	726,927.49	123,253.52	147,435.08
Ohio	4,807,384.06	640,040.32	183,361.88	151,395.42	1,760,901.54
Oklahoma	91,681.91	862,631.36	1,029,066.47	198,905.94	211,323.24
Oregon		16,895.50	227,888.98	71,097.13	50,285.03
Pennsylvania		26,829.90	96,112.43	93,239.72	33,065.05
Rhode Island	36.84		2,140.00		
South Carolina		18,005.20	85,784.48	58,141.93	15,130.33
South Dakota	3,105,739.93	1,917,082.74	618,425.77	379,106.52	968,622.19
Tennessee	62,941.77	616,820.99	737,163.07	119,118.74	105,129.07
Texas	414,539.68	1,035,769.41	423,072.41	149,705.03	181,401.79
Utah	32,529.20	22,192.57	14,321.42	9,045.03	4,293.33
Vermont	1,600.00	2,236.28	20,661.75	5,918.35	1,387.79
Virginia	484,111.66	96,843.00	18,337.87	21,261.05	111,343.66
Washington	1,879.61	40,229.61	19,637.31	11,616.42	58,012.89
West Virginia	34,563.33	24,231.91	29,404.61	21,289.69	19,660.54
Wisconsin	867,864.29	1,789,623.68	161,300.45	130,197.85	455,903.75
Wyoming		43,019.07	124,331.59	36,692.74	22,845.19
Total	38,413,350.53	46,523,610.67	27,723,465.07	7,650,989.73	21,834,286.03

EXHIBIT 11.

Sugar rental and benefit payments through Dec. 31, 1934—Analyzed by State and Month

State	Total	December 1934
Louisiana	\$46,749.30	\$46,749.30
Utah	8,792.00	8,792.00
Total	55,541.30	55,541.30

EXHIBIT 12

Rental and benefit payments through Dec. 31, 1934—By States and counties

ALABAMA

County	Cotton		Tobacco, 1934	Corn-hog, 1934	All commodities		
	1933	Total			1933	1934	Total
Autauga	\$137,597.15	\$245,225.53		\$3,923.75	\$137,597.15	\$111,552.18	\$249,149.33
Baldwin	13,849.52	26,361.63		2,187.10	13,849.52	14,688.66	28,548.18
Bibb	114,590.75	219,142.86		13,752.93	114,590.75	118,305.04	232,895.79
Blount	56,118.17	102,416.53		2,514.70	56,118.17	48,813.06	104,931.23
Bullock	146,274.67	306,051.68			146,274.67	159,777.01	306,051.68
Butler	76,656.50	136,098.05		2,059.20	76,656.50	61,500.76	138,157.26
Burley	174,080.96	305,087.43		11,506.18	174,080.96	142,492.65	316,573.61
Calhoun	107,858.13	230,741.61		1,759.20	107,858.13	122,883.43	230,741.61
Chambers	159,964.85	317,278.96			159,964.85	159,073.31	319,038.16
Cherokee	199,225.00	395,756.35			199,225.00	196,530.75	395,756.35
Chilton	177,595.85	316,335.23		1,003.70	177,595.85	139,743.93	317,339.78
Choctaw	77,560.50	125,867.55			77,560.50	48,307.05	125,867.55
Clarke	70,449.25	116,328.14		2,365.00	70,449.25	48,243.84	118,693.09
Clay	98,705.10	173,462.84		602.20	98,705.10	75,384.34	174,089.44
Cleburne	60,049.50	103,216.26			60,049.50	43,768.96	103,818.46
Coffee	177,772.50	338,085.80		17,496.63	177,772.50	177,809.93	355,582.43
Colbert	149,094.81	283,286.99		1,027.00	149,094.81	135,213.18	284,307.99
Concuh	103,276.63	211,804.64		5,452.05	103,276.63	113,980.06	217,256.69
Coosa	56,560.50	97,689.12		4,217.10	56,560.50	45,345.72	101,906.22
Covington	207,557.00	344,922.61		8,424.05	207,557.00	145,789.66	353,346.66
Crenshaw	130,777.00	244,174.07		9,811.45	130,777.00	114,208.52	253,985.52
Cullman	301,055.64	627,757.86			301,055.64	326,702.22	627,757.86
Dale	83,289.34	163,826.34		24,482.78	83,289.34	105,019.78	188,309.12
Dallas	181,032.57	374,383.09		3,699.90	181,032.57	197,050.42	378,082.99
De Kalb	278,123.50	482,899.10		1,692.80	278,123.50	206,468.40	484,591.90
Elmore	199,034.55	369,644.99		4,274.25	199,034.55	174,884.69	373,919.24
Escambia	102,576.35	203,430.67		775.90	102,576.35	101,630.22	204,206.57
Etowah	165,931.69	324,397.00		1,857.70	165,931.69	160,323.01	326,254.70
Fayette	74,776.22	156,288.56		1,786.20	74,776.22	83,263.54	158,044.76
Franklin	131,407.24	245,858.87		405.25	131,407.24	114,856.88	246,264.12
Geneva	107,428.29	235,893.20		4,850.65	107,428.29	122,812.56	230,240.85
Greene	96,344.04	176,144.78		1,205.50	96,344.04	81,006.24	177,350.28
Hale	150,072.70	286,681.64			150,072.70	136,608.94	286,681.64
Henry	144,346.84	254,529.66		1,829.00	144,346.84	112,011.82	256,358.66
Houston	236,259.50	476,745.20		1,819.73	236,259.50	242,305.43	478,564.93
Jackson	151,174.90	295,235.94		17,116.80	151,174.90	161,177.84	312,352.74
Jefferson	50,403.20	65,825.10		807.65	50,403.20	16,229.55	66,632.75
Lamar	119,963.47	232,438.95		69.25	119,963.47	132,525.48	252,488.95
Laurel	228,418.80	468,893.71			228,418.80	228,544.16	468,962.96
Lawrence	243,934.50	451,865.11		1,052.65	243,934.50	208,993.26	452,927.76
Lee	160,876.31	302,418.75		2,227.00	160,876.31	143,709.44	304,585.75

	326, 679.55	326, 544.54	653, 224.09	\$30.00	3, 980.70	326, 679.55	330, 555.24	657, 224.79
Limestone.....					5, 765.65	85, 528.25	83, 038.28	168, 566.53
Lowndes.....	117, 196.00	77, 272.63	162, 800.88		802.40	117, 196.00	142, 905.66	260, 101.66
Madison.....	420, 065.96	349, 162.59	769, 228.55	1, 536.00	2, 641.20	420, 065.96	353, 339.79	773, 405.75
Marengo.....	215, 399.10	150, 989.74	366, 388.84		865.85	215, 399.10	150, 989.74	366, 388.84
Marion.....	116, 242.65	77, 623.45	193, 866.10			116, 242.65	78, 489.30	194, 731.95
Marshall.....	242, 535.08	346, 296.00	588, 831.08			242, 535.08	346, 296.00	588, 831.08
Mobile.....	17, 191.83	15, 012.12	32, 203.95			17, 191.83	15, 448.82	32, 640.65
Montgomery.....	166, 189.62	170, 285.37	336, 474.99		436.70	166, 189.62	170, 908.33	337, 097.95
Morgan.....	110, 501.77	83, 248.57	193, 750.34		4, 566.25	110, 501.77	87, 814.82	198, 316.59
Perry.....	216, 761.27	203, 295.37	420, 056.64		1, 550.50	216, 761.27	204, 845.87	421, 607.14
Pickens.....	158, 191.56	130, 972.68	296, 162.18		1, 868.10	158, 191.56	139, 838.72	298, 030.28
Pike.....	155, 049.26	142, 312.63	297, 361.89		267.45	155, 049.26	131, 240.05	267, 271.78
Randolph.....	157, 960.35	132, 342.01	290, 302.36		18, 404.84	157, 960.35	132, 342.01	290, 302.36
Russell.....	96, 682.75	49, 584.64	146, 267.39		1, 212.50	96, 682.75	50, 797.14	147, 479.89
St. Clair.....	73, 749.07	77, 967.05	151, 716.12		1, 026.55	73, 749.07	78, 993.60	152, 742.67
Shelby.....	76, 953.46	69, 284.32	146, 237.78		937.50	76, 953.46	70, 221.82	147, 175.28
Sumter.....	102, 427.73	106, 831.06	209, 258.79		3, 379.55	102, 427.73	110, 210.61	212, 638.34
Talladega.....	165, 188.62	146, 964.07	312, 152.69		165, 188.62	165, 188.62	146, 964.07	312, 152.69
Tallapoosa.....	155, 049.32	104, 741.67	259, 790.99		4, 181.00	155, 049.32	108, 922.67	263, 971.99
Tuscaloosa.....	127, 670.39	143, 213.85	270, 884.24		4, 840.00	127, 670.39	148, 053.85	275, 724.24
Walker.....	88, 296.09	57, 623.18	145, 919.27		4, 395.25	88, 296.09	62, 018.43	150, 314.52
Washington.....	21, 248.01	14, 446.19	35, 694.20		4, 406.50	21, 248.01	14, 852.69	36, 100.70
Wilcox.....	106, 560.79	89, 520.84	196, 081.63		328.68	106, 560.79	89, 549.52	196, 410.31
Winston.....	98, 592.43	78, 265.89	176, 858.32		1, 152.85	98, 592.43	79, 418.74	178, 011.17
Total.....	9, 537, 007.25	8, 544, 792.56	18, 081, 799.81	1, 566.00	222, 324.83	9, 537, 007.25	8, 768, 683.39	18, 305, 690.64

ARIZONA

County	Cotton			Wheat		Corn-hog, 1934	All commodities		
	1933	1934	Total	1933	1934		1933	1934	Total
Apache.....					\$205.55			\$205.55	
Coconino.....					806.15	\$36.00		842.15	
Gila.....						36.00		36.00	
Graham.....	\$24,571.00	\$72,048.18	\$96,619.18		3,681.78	4,834.16		80,564.12	
Greenlee.....	2,298.88	2,298.88	2,298.88		154.20	819.40		3,545.38	
Maricopa.....	114,647.00	395,738.90	510,385.90		7,002.20	16,705.34		544,801.28	
Navajo.....					55.35	811.05		866.40	
Pima.....		3,739.32	3,739.32			646.00		4,385.32	
Pinal.....	89,769.00	97,877.60	187,646.60		1,876.08			99,753.68	
Santa Cruz.....						177.60		177.60	
Yavapai.....					131.75	1,638.45		1,770.20	
Yuma.....	29,394.96	102,120.97	131,515.93			1,940.00		1,770.20	
Total.....	258,381.96	673,823.85	932,205.81	9,812.20	17,737.40	27,644.00	268,194.16	719,205.25	
								987,399.41	

Rental and benefit payments through Dec. 31, 1934—By States and counties—Continued

ARKANSAS

County	Cotton		Wheat, 1934	Tobacco, 1934	Corn-hog, 1934	All commodities		
	1933	1934				1933	1934	Total
Arkansas.....	\$82, 116. 78	\$43, 286. 97			\$14. 00	\$82, 116. 78	\$43, 300. 97	\$125, 417. 75
Ashley.....	182, 218. 76	176, 389. 32				182, 218. 76	176, 389. 32	358, 608. 08
Baxter.....	23, 398. 13	9, 582. 73			25, 723. 21	23, 398. 13	35, 305. 94	58, 704. 07
Benton.....					34, 321. 47		34, 321. 47	34, 321. 47
Boone.....	6, 612. 25	3, 031. 79				6, 612. 25	27, 194. 42	33, 806. 67
Bradley.....	77, 604. 61	77, 322. 48			24, 162. 63	71, 604. 61	77, 806. 48	149, 411. 09
Calhoun.....	56, 218. 00	54, 705. 70			24, 484. 00	56, 218. 00	110, 923. 70	110, 923. 70
Carroll.....			\$123. 53	\$180. 00	24, 799. 37		25, 102. 90	25, 102. 90
Chicot.....	208, 626. 50	177, 048. 38				208, 626. 50	177, 048. 38	385, 674. 88
Clark.....	111, 375. 96	220, 158. 89				111, 375. 96	108, 782. 93	220, 158. 89
Clay.....	280, 776. 04	143, 234. 67			26, 466. 51	280, 776. 04	169, 701. 18	450, 477. 22
Cleburne.....	69, 809. 10	53, 243. 75			4, 383. 48	69, 809. 10	57, 627. 23	127, 436. 33
Cleveland.....	101, 790. 75	91, 592. 87				101, 790. 75	91, 592. 87	193, 383. 62
Columbia.....	219, 754. 50	191, 673. 12			122. 50	219, 754. 50	191, 795. 62	411, 550. 12
Conway.....	134, 554. 31	148, 749. 04			840. 30	134, 554. 31	149, 589. 34	284, 143. 65
Craighead.....	506, 559. 50	326, 202. 91			14, 460. 09	506, 559. 50	340, 663. 00	847, 222. 50
Crawford.....	35, 842. 50	24, 876. 58			11, 116. 30	35, 842. 50	35, 992. 88	71, 835. 38
Crittenden.....	576, 552. 36	458, 700. 30				576, 552. 36	488, 700. 30	1, 035, 252. 72
Cross.....	198, 184. 38	162, 652. 64			665. 90	198, 184. 38	163, 313. 84	361, 502. 92
Dallas.....	48, 013. 12	38, 485. 02				48, 013. 12	38, 485. 02	86, 498. 14
Deshia.....	216, 606. 25	107, 394. 57				216, 606. 25	107, 394. 57	324, 000. 82
Drew.....	134, 403. 81	95, 032. 14				134, 403. 81	95, 032. 14	229, 435. 95
Faulkner.....	223, 990. 42	199, 054. 51				223, 990. 42	199, 429. 76	423, 420. 18
Franklin.....	33, 609. 78	18, 253. 10			375. 25	33, 609. 78	25, 095. 34	58, 705. 12
Fulton.....	52, 958. 22	23, 315. 37			6, 842. 24	52, 958. 22	52, 399. 72	105, 357. 94
Garland.....	16, 730. 57	8, 144. 29			29, 084. 35	16, 730. 57	9, 415. 29	26, 145. 86
Grant.....	40, 024. 94	32, 621. 29			1, 271. 00	40, 024. 94	32, 711. 49	72, 736. 43
Greene.....	209, 266. 79	136, 627. 57			22, 938. 17	209, 266. 79	158, 165. 74	367, 432. 53
Hempstead.....	176, 226. 42	148, 627. 32			225. 55	176, 226. 42	148, 852. 85	325, 079. 27
Hot Spring.....	52, 767. 46	37, 286. 22			196. 00	52, 767. 46	37, 482. 22	90, 249. 68
Howard.....	71, 812. 40	55, 144. 67			4, 756. 15	71, 812. 40	59, 900. 82	131, 713. 22
Independence.....	159, 096. 27	85, 446. 44			23, 227. 91	159, 096. 27	108, 674. 35	267, 770. 62
Izard.....	63, 859. 00	63, 159. 04			8, 941. 53	63, 859. 00	72, 100. 57	135, 959. 57
Jackson.....	280, 773. 05	286, 868. 43			5, 270. 73	280, 773. 05	292, 139. 16	572, 912. 21
Jefferson.....	413, 971. 31	328, 580. 15			8, 464. 95	413, 971. 31	328, 580. 15	742, 551. 46
Johnson.....	39, 494. 25	25, 480. 75				39, 494. 25	33, 945. 70	73, 439. 95
Lafayette.....	138, 137. 10	143, 834. 46				138, 137. 10	143, 834. 46	281, 971. 56
Lawrence.....	175, 429. 30	172, 758. 01			40, 274. 33	175, 429. 30	213, 032. 34	388, 461. 64

Lee.....	263, 071.05	267, 908.32	530, 979.37	442.80	263, 071.05	268, 351.12	531, 422.17
Lincoln.....	240, 876.50	206, 464.99	447, 341.49	546.46	240, 876.50	206, 464.99	447, 341.49
Little River.....	137, 045.21	89, 725.83	226, 771.04	637.50	137, 045.21	90, 272.29	227, 317.50
Logan.....	93, 249.57	64, 993.93	158, 243.50	2, 196.25	93, 249.57	65, 631.43	158, 881.00
London.....	365, 828.16	328, 136.39	694, 998.55	16, 692.90	365, 828.16	331, 626.64	697, 154.80
Madison.....	18, 160.67	9, 306.49	27, 467.16	19, 905.68	18, 160.67	16, 692.90	16, 692.90
Marion.....	208, 031.76	162, 991.22	371, 022.98	224.50	208, 031.76	28, 212.17	371, 022.98
Miller.....	863, 889.00	1, 088, 365.33	1, 952, 254.33	7, 475.24	863, 889.00	163, 215.72	371, 247.48
Mississippi.....	112, 843.75	178, 980.74	291, 824.49	359.10	112, 843.75	1, 095, 840.57	1, 095, 840.57
Monroe.....	32, 628.46	16, 067.98	48, 686.44	766.61	32, 628.46	179, 339.84	292, 183.59
Montgomery.....	123, 621.70	101, 460.73	225, 082.43	1, 005.75	123, 621.70	102, 466.48	49, 463.05
Nevada.....	5, 198.25	2, 715.46	7, 913.71	17, 420.15	5, 198.25	20, 135.61	25, 333.86
Newton.....	69, 792.61	51, 421.47	121, 214.08	1, 100.90	69, 792.61	51, 421.47	121, 214.08
Onachita.....	35, 389.09	31, 438.86	66, 827.95	1, 283.16	35, 389.09	32, 539.76	67, 928.85
Perry.....	333, 590.80	245, 610.92	579, 201.72	4, 603.05	333, 590.80	245, 610.92	579, 201.72
Phillips.....	62, 687.13	40, 010.60	102, 697.73	4, 994.65	62, 687.13	41, 293.76	103, 980.89
Pike.....	304, 369.00	217, 566.20	521, 935.20	4, 824.45	304, 369.00	222, 169.25	526, 538.25
Poinsett.....	23, 292.17	16, 852.16	40, 144.33	2, 930.54	23, 292.17	17, 846.81	41, 138.93
Polk.....	122, 952.25	130, 307.05	253, 259.30	6, 829.30	122, 952.25	135, 131.50	258, 083.75
Pope.....	74, 238.23	74, 928.12	149, 166.35	46, 586.83	74, 238.23	77, 858.66	152, 096.89
Prairie.....	255, 102.14	222, 503.95	477, 606.09	405.00	255, 102.14	229, 333.25	484, 435.39
Pulaski.....	148, 517.25	93, 566.18	242, 083.43	25.00	148, 517.25	140, 153.01	288, 670.26
Randolph.....	364, 117.21	303, 076.63	667, 193.84	24.90	364, 117.21	303, 482.38	667, 599.59
St. Francis.....	15, 598.22	9, 983.24	25, 581.46	21, 364.45	15, 598.22	10, 008.21	23, 606.46
Saline.....	37, 861.38	25, 093.44	62, 954.82	1, 897.45	37, 861.38	25, 118.34	62, 979.72
Scott.....	13, 450.46	9, 640.94	23, 091.40	1, 905.81	13, 450.46	31, 005.39	44, 455.85
Searcy.....	38, 506.05	27, 305.89	65, 811.94	1, 905.81	38, 506.05	29, 203.34	67, 709.39
Sebastian.....	35, 033.48	37, 875.75	72, 999.23	18, 334.28	35, 033.48	39, 781.56	74, 815.04
Sevier.....	61, 647.29	59, 939.09	121, 586.38	10, 492.71	61, 647.29	78, 273.37	139, 920.66
Sharp.....	21, 298.20	11, 470.81	32, 769.01	7, 651.25	21, 298.20	21, 963.62	43, 261.72
Stone.....	87, 893.60	101, 836.05	189, 729.65	36, 684.95	87, 893.60	102, 140.60	190, 034.20
Union.....	76, 084.48	39, 333.00	115, 417.48	18, 339.84	76, 084.48	46, 984.25	123, 068.73
Van Buren.....	242, 527.14	224, 363.40	466, 890.54	2, 338.98	242, 527.14	39, 023.03	39, 023.03
Washington.....	167, 686.44	374, 149.69	728, 150.45	2, 893.57	167, 686.44	242, 703.24	485, 220.38
White.....	206, 463.25	118, 572.03	278, 150.45	2, 893.57	206, 463.25	167, 500.69	374, 263.91
Woodruff.....	159, 578.42				159, 578.42	121, 465.60	281, 044.02
Yell.....							
Total.....	10, 667, 598.82	9, 034, 183.20	19, 701, 782.02	576, 882.70	10, 667, 598.82	9, 613, 708.41	20, 281, 307.23

Rental and benefit payments through Dec. 31, 1934—by States and counties—Continued

CALIFORNIA

County	Cotton			Wheat		Corn-hog, 1934	All commodities		
	1933	1934	Total	1933	1934		1933	1934	Total
Alameda						\$10,698.66			\$10,698.66
Amador						3,975.53			4,747.56
Butte						47,745.85			99,498.98
Calaveras						1,689.22	\$27,081.60		1,689.22
Colusa						36,142.86			76,224.65
Contra Costa						5,238.41			14,385.98
Del Norte									262.00
Eldorado						383.58			383.58
Fresno	\$43,178.00	\$235,014.19	\$278,192.19			51,246.37	43,178.00		421,418.02
Glenn						29,137.43			73,182.44
Humboldt						1,115.88			1,115.88
Imperial						46,542.33			55,337.23
Kern	6,120.67	8,572.24	14,692.91			29,265.28	6,120.67		61,457.90
Kings	15,248.00	162,283.94	177,531.94			18,885.05	214,949.13		230,197.13
Lake	28,453.00	66,997.24	95,450.24			2,727.81	407,529.06		436,052.06
Lassen						3,465.52			2,727.81
Los Angeles						62,436.32	7,294.00		14,222.36
Madera						19,923.06			73,526.76
Marin	21,091.00	98,577.28	119,668.28			4,333.07	21,091.00		184,950.05
Mariposa						5,090.50			4,549.00
Mendocino						7,859.09			5,090.50
Merced						29,126.50			10,670.86
Modoc	6,130.00	48,759.64	54,889.64			5,663.70	6,130.00		85,338.03
Monterey						30,226.25	403.60		11,975.31
Napa						5,427.49			85,566.43
Nevada						2,122.74			10,224.42
Orange						7,023.20			2,122.74
Placer						7,435.74			7,284.52
Plumas						2,085.28			12,348.87
Riverside						23,357.63	3,923.80		3,012.81
Sacramento						89,019.37			52,089.21
San Benito	11,696.00	14,594.63	26,290.63			14,136.95	11,696.00		63,785.21
San Bernardino						5,594.33			112,561.90
San Diego						3,333.28			9,326.64
San Francisco						1,204.01			73,134.64
San Joaquin						69,893.32			11,626.27
San Luis Obispo						122,066.24			508.86
San Mateo						69,893.32			103,622.60
						122,066.24			150,148.85
						50,794.87			50,794.87

Santa Barbara.....	9, 019.12	9, 019.12	8, 211.99	17, 231.11
Santa Clara.....	---	---	6, 001.41	6, 001.41
Santa Cruz.....	---	---	2, 852.71	2, 852.71
Shasta.....	8, 755.40	12, 885.06	36, 983.97	49, 869.03
Sierra.....	---	---	429.53	429.53
Siskiyou.....	---	---	26, 362.85	118, 967.51
Solano.....	---	---	3, 757.44	36, 006.56
Sonoma.....	---	---	1, 168.28	10, 739.81
Stanislaus.....	1, 040.00	1, 297.74	29, 811.22	52, 207.58
Sutter.....	---	---	98, 278.35	130, 579.11
Tehama.....	---	---	11, 132.19	47, 193.15
Trinity.....	---	---	445.86	1, 392.84
Tulare.....	27, 825.00	199, 708.90	75, 110.10	349, 117.01
Tuolumne.....	---	---	1, 684.25	2, 963.53
Ventura.....	---	---	989.80	6, 636.89
Yolo.....	---	---	31, 383.70	86, 063.20
Yuba.....	---	---	26, 834.80	20, 284.43
Total.....	160, 781.67	835, 805.80	996, 587.47	3, 537, 661.44

COLORADO

County	Wheat			All commodities		
	1933	1934	Total	Corn-hog, 1934	1933	1934
Adams.....	\$55, 252.20	\$86, 654.32	\$141, 906.52	\$44, 361.16	\$55, 252.20	\$131, 015.48
Alamosa.....	1, 909.20	942.65	2, 851.85	8, 079.64	1, 909.20	9, 022.29
Arapahoe.....	---	110, 367.70	110, 367.70	21, 152.57	---	131, 520.27
Archuleta.....	---	577.30	577.30	---	---	577.30
Baca.....	---	406, 028.89	406, 028.89	48, 863.65	---	454, 892.54
Bent.....	3, 957.80	8, 527.98	12, 485.78	25, 551.91	3, 957.80	38, 037.69
Boulder.....	---	52, 778.58	52, 778.58	7, 673.17	---	60, 451.75
Chaffee.....	---	2, 283.84	2, 283.84	5, 079.91	---	7, 363.75
Cheyenne.....	6, 638.00	14, 182.34	20, 820.34	32, 794.21	6, 638.00	46, 976.55
Conejos.....	8, 437.60	2, 911.55	11, 349.15	14, 485.30	8, 437.60	25, 834.45
Costilla.....	---	2, 754.20	2, 754.20	6, 800.64	---	9, 554.84
Crowley.....	82.40	389.53	471.93	10, 794.74	82.40	11, 184.27
Custer.....	---	678.90	678.90	---	---	678.90
Delta.....	4, 010.80	5, 468.64	9, 479.44	7, 694.00	4, 010.80	13, 162.64
Dolores.....	1, 609.80	1, 000.01	2, 609.81	164.00	1, 609.80	2, 773.81
Douglas.....	5, 854.40	8, 047.79	13, 902.19	9, 495.65	5, 854.40	17, 543.44
Eagle.....	---	442.54	442.54	622.38	---	1, 064.92
Elbert.....	---	51, 463.91	51, 463.91	31, 510.47	---	82, 974.38
El Paso.....	---	3, 373.36	3, 373.36	22, 595.45	---	25, 968.81
Fremont.....	---	572.34	572.34	4, 199.75	---	4, 772.09
Garfield.....	---	5, 735.54	5, 735.54	10, 993.30	---	16, 778.84

Rental and benefit payments through Dec. 31, 1934—by States and counties—Continued
 COLORADO—Continued

County	Wheat			Corn-hog, 1934	All commodities		
	1933	1934	Total		1933	1934	Total
Gunnison.....	.....	.....	.....	\$48.00	.....	\$48.00	\$48.00
Huerfano.....	.....	.....	.....	2,362.03	.....	8,575.13	8,575.13
Jefferson.....	.....	.....	.....	5,858.38	.....	31,080.98	45,108.38
Kiowa.....	\$14,018.40	25,231.59	39,249.99	25,992.28	\$14,018.40	39,483.19	39,483.19
Kit Carson.....	.....	13,490.91	13,490.91	96,332.68	.....	225,648.95	225,648.95
La Plata.....	.....	129,316.27	129,316.27	3,786.69	.....	11,465.79	11,465.79
Larimer.....	.....	7,679.10	7,679.10	12,484.75	.....	111,963.48	111,963.48
Las Animas.....	5,087.40	99,478.73	99,478.73	15,331.31	5,087.40	21,946.62	27,034.02
Lincoln.....	20,180.80	6,615.31	11,702.71	43,808.91	20,180.80	109,678.58	129,859.38
Logan.....	.....	65,869.67	86,050.47	67,444.64	.....	351,127.16	351,127.16
Mesa.....	.....	283,682.52	283,682.52	11,828.17	5,805.20	19,132.36	24,937.56
Moffat.....	5,805.20	7,304.19	13,109.39	2,506.81	11,756.00	17,643.49	29,399.49
Montezuma.....	11,756.00	15,136.68	26,892.68	5,328.88	.....	19,057.54	19,057.54
Montrose.....	.....	13,728.66	13,728.66	11,090.26	.....	31,756.67	31,756.67
Morgan.....	32,860.60	20,666.41	20,666.41	79,356.67	32,860.60	129,133.66	161,994.26
Otero.....	1,104.20	49,776.99	82,637.59	22,450.60	1,104.20	23,402.33	24,506.53
Ouray.....	.....	951.73	2,055.93	298.00	.....	1,501.05	1,501.05
Phillips.....	.....	1,203.05	1,203.05	77,523.94	.....	335,981.63	335,981.63
Pitkin.....	258,457.69	258,457.69	258,457.69	77,523.94	.....	1,112.55	1,112.55
Prowers.....	.....	336.55	336.55	52,917.75	.....	129,920.57	129,920.57
Pueblo.....	7,300.00	77,002.82	77,002.82	11,820.75	7,300.00	23,809.53	23,809.53
Rio Blanco.....	3,886.80	4,898.78	12,288.78	806.49	3,886.80	5,799.26	5,799.26
Rio Grande.....	.....	1,105.97	4,092.77	14,715.58	.....	17,970.97	17,970.97
Routt.....	11,052.80	3,255.39	3,255.39	2,979.06	11,052.80	7,817.89	18,870.69
Saguache.....	1,310.00	4,838.83	15,891.63	7,011.30	1,310.00	9,188.62	10,498.62
San Miguel.....	.....	2,177.32	3,487.32	400.00	.....	1,662.89	1,662.89
Sedgwick.....	.....	1,262.89	1,262.89	41,142.41	65,214.00	155,363.56	220,577.56
Washington.....	65,214.00	114,221.15	179,435.15	98,326.08	.....	230,670.86	230,670.86
Weld.....	.....	132,344.78	132,344.78	65,860.76	.....	535,172.91	535,172.91
Yuma.....	.....	469,312.15	469,312.15	158,489.12	.....	396,368.68	396,368.68
.....	.....	237,879.56	237,879.56	.....	.....	.....	.....
Total.....	267,418.40	2,818,670.70	3,086,089.10	1,251,690.21	267,418.40	4,070,360.91	4,337,779.31

CONNECTICUT

County	Tobacco			Corn-hog, 1934	All commodities		
	1933	1934	Total		1933	1934	Total
Fairfield.....	\$851.20	\$5,046.52	\$5,897.72	\$2,011.75	\$851.20	\$7,053.27	\$7,909.47
Hartford.....	145,059.04	538,304.00	703,363.04	11,635.10	145,059.04	569,939.10	714,998.14
Litchfield.....	2,053.50	32,298.53	34,352.03	1,494.00	2,053.50	33,702.53	35,756.03
Middlesex.....	4,343.50	8,257.38	12,602.88	-----	4,343.50	8,257.38	12,602.88
New Haven.....	66.40	-----	66.40	3,011.00	66.40	3,011.00	3,077.40
New London.....	-----	-----	-----	2,222.00	-----	2,222.00	2,222.00
Tolland.....	17,382.35	48,715.67	66,098.02	1,452.50	17,382.35	50,163.17	67,550.52
Windham.....	-----	-----	-----	458.00	-----	458.00	458.00
Total.....	169,757.99	652,592.10	822,350.09	22,284.35	169,757.99	674,876.45	844,634.44

DELAWARE

County	Wheat			Corn-hog, 1934	All commodities		
	1933	1934	Total		1933	1934	Total
Kent.....	\$27,856.20	\$31,008.14	\$59,464.34	\$6,424.63	\$27,856.20	\$38,032.77	\$65,888.97
New Castle.....	38,575.20	53,749.69	92,324.89	2,958.08	38,575.20	56,707.77	95,282.97
Sussex.....	-----	3,270.24	3,270.24	9,541.58	-----	12,811.82	12,811.82
Total.....	66,431.40	88,628.07	155,059.47	18,924.29	66,431.40	107,552.36	173,983.76

Rental and benefit payments through Dec. 31, 1934—by States and counties—Continued

FLORIDA

County	Cotton			Tobacco		Corn-hog, 1934	All commodities		
	1934		Total	1934			Total	1933	
	1933	1934	Total	1933	1934		Total	1933	1934
Alachua	\$3,244.50	\$1,387.10	\$4,631.60		\$24,579.38	\$13,804.13	\$3,244.50	\$39,770.61	\$43,015.11
Baker		57.83	57.83		541.34	599.59		1,198.76	1,198.76
Bay		90.00	90.00					90.00	90.00
Bradford								4,730.23	4,730.23
Calhoun	2,074.00		4,669.15		1,702.28	3,027.95	2,074.00	4,434.33	6,508.33
Citrus		2,595.15				1,759.95		759.95	759.95
Clay						146.85		146.85	146.85
Columbia	6,419.50	7,412.16	13,831.66		8,213.71	14,358.30	6,419.50	29,984.17	36,403.67
Dixie						1,130.20		1,130.20	1,130.20
Escambia	13,844.22	10,630.12	24,474.34			973.80	13,844.22	11,603.92	25,448.14
Gadsden	2,389.50	977.11	3,366.61			3,153.25	53,637.75	50,404.95	104,102.70
Gilchrist	531.00	234.86	765.86	\$51,248.25	46,334.59	5,567.86	531.00	5,802.72	6,333.72
Hamilton	7,366.00	12,620.79	19,986.79		34,730.13	1,253.26	7,366.00	48,604.18	55,970.18
Hernando						133.50		133.50	133.50
Holmes	19,587.03	21,663.68	41,250.71		172.15	1,829.58	19,587.03	23,665.41	43,252.44
Jackson	40,455.75	47,987.43	88,443.18		1,530.69	11,375.00	40,455.75	60,893.12	101,348.87
Jefferson	8,619.50	6,109.93	14,729.43		831.58	8,991.14	8,619.50	15,832.65	24,452.15
Lafayette	5,320.00	2,000.93	7,380.93		6,955.89	3,110.70	5,320.00	12,127.52	17,447.52
Leon	14,829.25	11,686.37	26,515.62	231.60	530.26	2,283.80	15,000.85	14,500.43	29,561.28
Levy	3,029.50	670.33	3,699.83		148.05	17,949.18	3,029.50	18,767.56	21,797.06
Madison	13,500.11	17,287.71	30,787.82	11,626.20	23,742.21	4,149.40	25,126.31	45,179.32	70,305.63
Marion	260.00	52.00	312.00			10,354.56	260.00	10,406.56	10,606.56
Okaloosa	29,299.00	20,361.01	49,660.01			1,681.42	29,299.00	22,042.43	51,341.43
Orange						146.25		146.25	146.25
Polk						736.60		736.60	736.60
Putnam						717.10		717.10	717.10
St. Johns						2,308.45		2,308.45	2,308.45
Santa Rosa	52,197.50	33,119.64	85,317.14			272.65	52,197.50	33,392.29	85,589.79
Sumter						378.42		378.42	378.42
Suwannee	16,991.60	13,133.07	30,124.67		30,070.96	15,956.30	16,991.60	59,160.33	76,151.93
Taylor	782.75	412.92	1,195.67			492.55	782.75	905.47	1,688.22
Union	175.00	114.17	289.17		1,733.77	8,855.13	173.00	10,703.07	10,878.07
Wakulla	593.25	141.65	734.90			591.35	593.25	733.00	1,326.25
Walton	15,118.68	13,047.35	28,166.03			5,488.11	15,118.68	18,535.46	33,654.14
Washington	3,422.45	5,102.31	8,524.76			733.60	3,422.45	5,835.91	9,258.36
Total	260,050.09	228,955.62	489,005.71	63,106.05	181,816.99	145,049.11	323,156.14	555,821.72	878,977.86

GEORGIA

County	Cotton			Wheat, 1934	Tobacco			Corn-hog, 1934	All commodities		
	1933	1934	Total		1933	1934	Total		1933	1934	Total
Appling	\$23,606.71	\$28,265.62	\$51,872.33				\$47,731.08		\$23,606.71	\$75,996.70	\$99,603.41
Atkinson	7,092.00	8,551.71	15,643.71				27,343.40		7,092.00	35,895.11	42,987.11
Bacon	12,070.70	22,825.48	34,896.18				46,980.72		12,070.70	69,806.20	81,876.90
Baker	27,959.03	23,471.39	51,430.42						27,959.03	23,471.39	51,430.42
Baldwin	23,911.25	34,191.01	58,102.26						23,911.25	34,191.01	58,102.26
Barrow	38,922.50	45,716.96	84,639.46						38,922.50	45,716.96	84,639.46
Bartow	48,806.13	61,899.52	110,705.65						48,806.13	61,899.52	110,705.65
Beech	113,406.25	158,603.50	272,009.75						113,406.25	158,603.50	272,009.75
Ben Hill	41,424.50	42,025.76	83,450.26				7,558.43		41,424.50	49,584.19	91,008.69
Berrien	24,379.75	28,063.60	52,443.35				159,671.11		24,379.75	187,734.71	212,114.46
Bibb	13,554.00	12,859.06	26,413.06					\$576.12	13,554.00	13,435.18	26,989.18
Bleckley	62,251.50	39,280.20	101,531.70						62,251.50	39,280.20	101,531.70
Brantley	160.00	238.47	398.47						160.00	19,688.80	19,848.80
Brooks	32,419.44	55,198.31	87,617.75				19,450.33		32,419.44	85,913.66	118,333.10
Bryan	794.00	2,721.03	3,515.03				26,736.83		794.00	647.27	1,441.27
Bulloch	115,488.25	135,213.97	250,702.22				465.54		115,488.25	185,530.88	301,019.13
Burke	257,352.75	234,121.57	491,474.32				44,747.49		257,352.75	234,197.02	491,549.77
Butts	36,694.00	45,083.33	81,747.33				75.45		36,694.00	45,083.33	81,747.33
Calhoun	28,145.30	51,005.45	79,150.75					257.32	28,145.30	51,262.77	79,408.07
Candler	45,179.75	34,709.34	79,889.09					88.82	45,179.75	64,355.77	109,535.52
Carroll	150,855.34	210,759.82	361,615.16				29,557.61		150,855.34	210,759.82	361,615.16
Catoosa	12,551.67	15,773.53	28,325.20					368.22	12,551.67	16,141.75	28,693.42
Charlton	33.00		33.00						33.00	2,069.13	2,102.13
Chatham	276.00		276.00				2,069.13		276.00	2,444.12	2,720.12
Chattahoochee	11,101.00	11,543.38	22,644.38				17.50		11,101.00	11,815.70	22,916.70
Chattooga	42,130.75	62,745.75	104,876.50					275.32	42,130.75	62,745.75	104,876.50
Cherokee	43,286.75	60,124.34	103,411.09						43,286.75	60,124.34	103,411.09
Clarke	31,157.20	45,224.53	76,381.73						31,157.20	45,224.53	76,381.73
Clay	37,696.00	27,548.25	65,244.25					580.92	37,696.00	38,129.17	61,825.17
Clayton	36,996.75	26,265.55	63,262.30						36,996.75	26,265.55	63,262.30
Clinch		578.33	578.33				2,663.41			3,241.74	3,241.74
Cobb	81,186.72	107,959.47	189,146.19						81,186.72	107,959.47	189,146.19
Coffee	58,071.72	40,755.17	98,826.89					226.82	58,071.72	167,233.40	225,305.12
Colquitt	114,951.00	89,120.78	204,071.78				126,241.41		114,951.00	167,233.40	329,596.88
Columbia	54,007.17	43,633.10	97,640.27				124,169.08		54,007.17	43,633.10	97,640.27
Cook	22,425.30	26,966.18	49,391.48						22,425.30	110,017.86	132,443.16
Coweta	99,020.75	89,032.35	188,053.10				81,737.81		99,020.75	89,032.35	188,053.10
Crawford	11,847.00	11,773.83	23,620.83	\$425.34					11,847.00	12,199.17	32,046.17
Crisp	55,628.75	83,762.75	139,391.50						55,628.75	83,762.75	139,391.50
Dade	2,799.00	4,082.26	6,881.26				65.23		2,799.00	4,542.58	7,341.58
Dawson	4,691.00	4,986.58	9,677.58					460.32	4,691.00	4,986.58	9,677.58
Decatur	34,343.50	29,137.08	63,480.58						34,343.50	34,304.10	68,647.60
De Kalb	30,412.54	24,237.45	54,649.99				24,076.30		30,412.54	24,237.45	54,649.99

Rental and benefit payments through Dec. 31, 1934—by States and counties—Continued
 GEORGIA—Continued

County	Cotton			Wheat, 1934	Tobacco		Corn-hog, 1934	All commodities			
	1933	1934	Total		1933	1934		Total	1933	1934	Total
Dodge.....	\$135,004.28	\$140,673.50	\$275,677.78						\$135,004.28	\$140,673.50	\$275,677.78
Dooly.....	131,372.50	124,247.82	255,620.32						131,372.50	124,247.82	255,620.32
Dougherty.....	6,130.10	9,068.77	15,198.87				\$163.69		6,130.10	9,232.46	15,362.56
Douglas.....	34,285.63	38,233.86	72,519.49						34,285.63	38,233.86	72,519.49
Early.....	78,076.01	105,653.34	183,729.35					\$1,628.82	78,076.01	107,282.16	185,358.17
Elchols.....		833.37	833.37				4,546.31		5,379.68		5,379.68
Elkington.....	4,218.50	6,019.57	10,238.07				572.06	77.82	4,218.50	6,609.45	10,887.95
Elbert.....	66,204.43	95,364.96	161,569.39					28.32	66,204.43	95,393.28	161,597.71
Emanuel.....	149,237.75	165,226.99	314,463.84				12,114.84	7,055.82	149,237.75	184,396.75	333,634.50
Evans.....	20,293.50	20,590.39	40,883.89				8,196.46	384.72	20,293.50	29,181.57	49,475.07
Fayette.....	68,778.00	49,129.83	117,907.83						68,778.00	49,129.83	117,907.83
Floyd.....	100,666.17	98,218.99	198,885.16						100,666.17	98,218.99	198,885.16
Forsyth.....	56,243.61	79,502.20	135,745.81						56,243.61	79,502.20	135,745.81
Franklin.....	93,766.92	126,379.49	220,146.41						93,766.92	126,379.49	220,146.41
Franklin.....	53,563.35	77,803.35	131,366.70						53,563.35	77,803.35	131,366.70
Fulton.....	1,448.00	756.15	2,204.15						1,448.00	756.15	2,204.15
Gilmer.....	34,822.92	40,655.08	75,478.00						34,822.92	40,655.08	75,478.00
Glascock.....	75,034.87	106,661.28	181,696.15					138.25	75,034.87	106,799.53	181,834.40
Gordon.....	23,516.03	19,795.36	43,311.39						25,946.03	32,246.27	58,192.30
Grady.....	41,632.50	46,265.28	87,897.78						41,632.50	46,265.28	87,897.78
Greene.....	93,315.75	140,677.04	233,992.79			\$2,430.00	12,450.91		93,315.75	140,677.04	233,992.79
Gwinnett.....	8,961.00	10,277.87	19,238.87					184.47	8,961.00	10,462.34	19,423.34
Habersham.....	59,618.50	74,925.88	134,544.38						59,618.50	74,925.88	134,544.38
Hall.....	68,111.50	51,677.74	119,789.24						68,111.50	51,677.74	119,789.24
Hancock.....	46,382.05	58,470.04	104,852.09						46,382.05	58,470.04	104,852.09
Haralson.....	49,003.54	32,398.52	81,402.06						49,003.54	32,398.52	81,402.06
Harris.....	108,857.75	142,858.72	251,716.47						108,857.75	142,858.72	251,716.47
Hart.....	65,519.75	60,741.64	126,261.39						65,519.75	60,741.64	126,261.39
Heard.....	97,723.50	128,163.39	225,886.89						97,723.50	128,163.39	225,886.89
Henry.....	35,152.75	39,060.69	74,213.44						35,152.75	41,805.19	76,957.94
Houston.....	101,657.75	55,072.15	156,729.90	\$1,193.33			37,792.45	1,479.42	101,657.75	92,864.60	194,522.35
Irwin.....	113,856.45	233,436.46	347,292.91						113,856.45	119,580.01	233,436.46
Jackson.....	24,064.71	23,791.03	47,855.74						24,064.71	23,791.03	48,455.74
Jasper.....	48,455.74	9,702.71	58,158.45						48,455.74	9,702.71	58,158.45
Jeff Davis.....	12,547.50	22,250.21	34,797.71				41,603.70		12,547.50	51,306.41	63,853.91
Jefferson.....	162,424.72	94,761.20	257,185.92				687.75		162,424.72	95,448.95	257,873.67
Jenkins.....	96,184.12	94,911.61	191,095.73				313.25	28.32	96,184.12	95,253.18	191,437.30
Johnston.....	108,425.50	87,898.26	196,323.76				338.94		108,425.50	88,237.20	196,662.70
Jones.....	18,705.00	10,564.63	29,269.63						18,705.00	10,564.63	29,269.63

Rental and benefit payments through Dec. 31, 1934—by States and counties—Continued
 GEORGIA—Continued

County	Cotton		Wheat, 1934	Tobacco		Corn-hog, 1934	All commodities		
	1933	1934	Total	1933	1934	Total	1933	1934	Total
Troup.....	\$61,973.00	\$47,237.92	\$109,210.92				\$61,973.00	\$47,237.92	\$109,210.92
Turner.....	39,238.75	40,165.70	79,404.45				39,238.75	40,165.70	79,404.45
Twigs.....	30,828.14	15,580.51	46,408.65				30,828.14	15,580.51	46,408.65
Upton.....	17,912.00	19,629.59	37,541.59				17,912.00	19,629.59	37,541.59
Walker.....	35,413.00	44,376.52	79,789.52				35,413.00	44,376.52	79,789.52
Walton.....	143,325.10	190,905.54	334,230.64				143,325.10	190,905.54	334,230.64
Ware.....	947.36	5,082.39	6,029.75				947.36	5,082.39	6,029.75
Warren.....	90,604.00	94,151.25	184,755.25				90,604.00	94,151.25	184,755.25
Washington.....	167,541.00	90,062.57	258,203.57				167,541.00	90,062.57	258,203.57
Wayne.....	18,602.25	23,400.53	42,002.78				18,602.25	23,400.53	42,002.78
Webster.....	12,269.00	12,698.14	24,967.14				12,269.00	12,698.14	24,967.14
Wheeler.....	64,386.50	50,181.36	114,567.86				64,386.50	50,181.36	114,567.86
White.....	5,642.19	7,252.26	12,894.45				5,642.19	7,252.26	12,894.45
Whitfield.....	39,132.41	33,525.58	72,657.99				39,132.41	33,525.58	72,657.99
Wilcox.....	112,553.81	85,536.35	198,090.16				112,553.81	85,536.35	198,090.16
Wilkes.....	87,887.50	82,404.45	170,351.95				87,887.50	82,404.45	170,351.95
Wilkinson.....	38,257.50	20,354.86	58,612.36				38,257.50	20,354.86	58,612.36
Worth.....	63,579.62	78,484.25	142,063.87				63,579.62	78,484.25	142,063.87
Total.....	7,904,830.27	8,181,026.24	16,085,856.51	\$9,015.80	\$21,390.60	\$30,406.40	7,926,220.87	9,724,519.24	17,650,740.11

IDAHO

County	Wheat		Corn-hog, 1934	All commodities		
	1933	1934	Total	1933	1934	Total
Ada.....		\$66,154.09	\$66,154.09		\$96,043.49	\$96,043.49
Adams.....		3,772.78	3,772.78		8,215.04	8,215.04
Bannock.....		290,018.02	290,018.02		306,532.64	306,532.64
Bear Lake.....		69,270.77	69,270.77		73,950.74	73,950.74
Benewah.....		109,207.64	109,207.64		114,200.14	114,200.14
Bingham.....		37,408.42	37,408.42		57,291.12	57,291.12
Blaine.....		12,028.94	12,028.94		19,996.79	19,996.79

Boise	5,529.96	5,529.96	2,254.75	7,784.71	7,784.71
Bonner	3,238.44	3,238.44	2,032.60	5,271.04	5,271.04
Bonneville	243,538.35	243,538.35	25,440.19	271,978.54	271,978.54
Bondeville	132,390.87	132,390.87	4,615.90	137,006.77	137,006.77
Butte	5,901.51	10,163.51	5,960.65	11,852.16	16,114.16
Camas	68,944.09	68,944.09	1,318.00	70,262.09	70,262.09
Canyon	74,821.39	74,821.39	67,371.75	142,193.14	142,193.14
Caribou	32,109.65	32,109.65	2,226.95	34,336.60	34,336.60
Cassia	123,643.76	123,643.76	20,592.06	144,235.82	144,235.82
Clark	1,709.43	2,393.83	1,629.57	3,339.00	4,023.40
Clearwater	21,657.14	21,657.14	2,632.60	24,289.74	24,289.74
Custer	1,408.75	1,939.75	2,456.65	3,865.40	4,396.40
Elmore	8,366.90	8,366.90	3,417.05	11,783.95	11,783.95
Franklin	137,276.01	137,276.01	10,346.00	147,622.01	147,622.01
Fremont	238,393.65	238,393.65	9,278.73	247,672.38	247,672.38
Gem	14,293.17	14,293.17	11,327.40	25,620.57	25,620.57
Gooding	10,365.47	10,365.47	18,406.25	28,771.72	28,771.72
Idaho	434,865.97	434,865.97	45,733.90	480,619.87	480,619.87
Jefferson	44,477.14	44,477.14	18,949.57	63,426.71	63,426.71
Jerome	98,859.00	98,859.00	21,652.71	120,511.71	120,511.71
Kootenai	95,294.41	95,294.41	4,832.31	100,126.72	100,126.72
Latah	374,323.65	374,323.65	25,983.84	400,307.49	400,307.49
Lemhi	5,202.71	7,060.91	4,154.41	9,357.12	11,215.32
Lewis	363,515.81	363,515.81	12,398.05	375,913.86	375,913.86
Lincoln	6,486.82	11,532.02	9,582.44	15,069.26	21,114.46
Madison	239,171.14	239,171.14	10,504.76	249,675.90	249,675.90
Minidoka	23,821.30	25,821.30	11,569.09	37,390.39	37,390.39
Nez Perce	496,324.48	496,324.48	27,848.65	526,173.13	526,173.13
Oneida	393,339.82	393,339.82	10,332.08	403,671.90	403,671.90
Owyhee	27,828.62	27,828.62	10,644.35	38,472.97	38,472.97
Payette	12,186.77	12,186.77	10,737.71	22,924.48	22,924.48
Power	303,853.26	303,853.26	3,496.68	307,349.94	307,349.94
Teton	72,171.10	72,171.10	4,124.85	76,295.95	76,295.95
Twin Falls	212,738.38	212,738.38	36,433.61	249,171.99	249,171.99
Valley	2,182.59	2,182.59	3,112.86	3,112.86	3,112.86
Washington	40,692.22	40,692.22	15,792.32	56,484.54	56,484.54
Total	4,962,784.39	4,975,165.19	568,988.00	5,531,772.39	5,544,153.19

Rental and benefit payments through Dec. 31, 1934—by States and counties—Continued

ILLINOIS

County	Wheat			Tobacco		Corn-hog, 1934	All commodities			
	1933	1934	Total	1933	1934		Total	1933	1934	Total
Adams.....	\$27, 247. 60	\$60, 845. 17	\$88, 092. 77				\$322, 279. 57	\$27, 247. 60	\$383, 124. 74	\$410, 372. 34
Alexander.....	1, 490. 40	2, 188. 17	3, 678. 57				23, 021. 39	1, 490. 40	25, 209. 56	26, 699. 96
Bond.....	6, 552. 80	10, 867. 70	17, 420. 50				64, 615. 64	6, 552. 80	75, 483. 34	82, 036. 14
Boone.....	1, 028. 40	1, 495. 04	2, 523. 44	\$183. 55	\$300. 40	\$483. 95	76, 367. 11	1, 211. 95	78, 162. 55	79, 374. 50
Brown.....	3, 234. 80	7, 420. 27	10, 655. 07				128, 439. 75	3, 234. 80	135, 860. 02	139, 094. 82
Bureau.....	8, 320. 60	12, 833. 94	21, 154. 54				507, 096. 08	8, 320. 60	519, 930. 02	528, 250. 62
Calhoun.....		10, 832. 96	10, 832. 96				55, 047. 43		66, 240. 39	66, 240. 39
Carroll.....		1, 988. 31	1, 988. 31				210, 326. 81		212, 315. 12	212, 315. 12
Cass.....		126, 572. 23	126, 572. 23				201, 940. 86		328, 513. 09	328, 513. 09
Champaign.....	16, 025. 80	34, 447. 20	50, 473. 00				434, 839. 51	16, 025. 80	469, 286. 71	485, 312. 51
Christian.....	18, 756. 38	30, 252. 70	49, 009. 08				286, 549. 34	18, 756. 38	316, 802. 04	335, 558. 42
Clark.....	3, 443. 00	5, 678. 11	9, 121. 11				104, 190. 09	3, 443. 00	109, 868. 20	113, 311. 20
Clay.....		1, 917. 23	1, 917. 23				49, 184. 62		51, 101. 85	51, 101. 85
Clinton.....	32, 301. 64	38, 500. 55	70, 802. 19				44, 547. 40	32, 301. 64	83, 047. 95	115, 349. 59
Coles.....		42, 365. 64	42, 365. 64				214, 897. 47		257, 263. 11	257, 263. 11
Cook.....	2, 181. 60	12, 502. 27	14, 683. 87				41, 951. 87	2, 181. 60	46, 178. 51	48, 360. 11
Crawford.....		3, 180. 29	3, 180. 29				97, 964. 02		110, 466. 29	110, 466. 29
Cumberland.....		5, 504. 13	5, 504. 13				386, 833. 11		86, 780. 89	86, 780. 89
De Kalb.....	4, 414. 40	3, 435. 60	7, 850. 00				191, 920. 18	4, 414. 40	392, 357. 24	396, 771. 64
De Witt.....		22, 006. 21	22, 006. 21				214, 540. 37	3, 435. 60	195, 638. 02	199, 074. 22
Douglas.....		2, 670. 40	2, 670. 40				57, 852. 96		236, 546. 58	236, 546. 58
Du Page.....	3, 315. 14	21, 082. 20	24, 397. 34				277, 448. 46	3, 315. 14	60, 523. 36	63, 838. 50
Edgar.....		10, 254. 58	10, 254. 58				54, 991. 99	21, 082. 20	313, 042. 43	334, 724. 63
Edwards.....	5, 678. 19	10, 869. 07	16, 547. 26				53, 830. 42	5, 678. 19	55, 246. 57	60, 924. 76
Efingham.....		7, 753. 06	7, 753. 06				160, 635. 30		64, 099. 49	64, 099. 49
Fayette.....		4, 016. 81	4, 016. 81				200, 867. 35		168, 388. 36	168, 388. 36
Ford.....	1, 244. 80	2, 212. 40	3, 457. 20				23, 203. 05	1, 244. 80	204, 884. 16	206, 128. 96
Franklin.....	1, 347. 40	46, 894. 21	75, 984. 81				406, 290. 20	1, 347. 40	25, 415. 45	26, 762. 85
Fulton.....	29, 090. 60	30, 082. 64	30, 082. 64				67, 813. 27	29, 090. 60	453, 184. 41	482, 275. 01
Gallatin.....		38, 731. 11	58, 161. 71				245, 025. 71		97, 895. 91	97, 895. 91
Greene.....	19, 430. 60	38, 731. 11	58, 161. 71				149, 016. 12	19, 430. 60	283, 756. 82	303, 187. 42
Grundy.....	1, 181. 60	1, 161. 10	2, 342. 70				26, 450. 35	1, 181. 60	153, 177. 22	154, 358. 82
Hamilton.....	1, 690. 00	2, 203. 81	3, 893. 81				470, 500. 11	1, 690. 00	28, 654. 16	30, 344. 16
Hancock.....	6, 022. 00	11, 560. 29	17, 582. 29				10, 021. 05	6, 022. 00	482, 060. 40	488, 082. 40
Hardin.....							10, 021. 05		10, 021. 05	10, 021. 05
Henderson.....	3, 812. 80	10, 625. 41	14, 438. 21				255, 988. 76	3, 812. 80	266, 614. 17	270, 426. 97
Henry.....	6, 230. 60	12, 386. 21	18, 616. 81				538, 379. 96	6, 230. 60	550, 766. 17	556, 996. 77
Iroquois.....	5, 347. 40	9, 984. 47	15, 331. 87				422, 464. 76	5, 347. 40	432, 449. 23	437, 796. 63
Jackson.....	22, 476. 40	25, 051. 48	47, 527. 88				49, 987. 86	22, 476. 40	75, 039. 34	97, 515. 74

Jasper	1,506.00	3,476.41	80,962.48	1,506.00	82,932.89	84,438.89
Jefferson	2,343.03	3,760.43	36,775.69	1,428.40	36,107.72	40,536.12
Jersey	46,243.05	46,243.05	127,337.47	306.00	173,580.52	173,580.52
Jo Daviess	456.63	774.63	204,772.31	306.00	205,534.94	205,852.94
Johnson	265.82	265.82	31,818.01	---	32,083.83	32,083.83
Kane	3,500.87	7,507.07	120,770.25	4,006.20	124,271.12	126,277.32
Kankakee	18,809.11	30,931.11	173,426.28	12,122.00	192,235.39	204,367.39
Kendall	3,549.90	6,993.90	146,949.63	2,444.00	150,499.53	152,943.53
Knox	14,814.05	21,761.05	423,455.69	6,947.00	444,269.14	451,216.14
Lake	15,771.83	1,619.23	21,492.41	847.40	22,264.24	23,111.64
La Salle	15,942.14	25,126.54	499,970.56	9,184.40	515,912.70	525,097.10
Lawrence	29,025.22	29,025.22	65,608.14	---	94,633.36	94,633.36
Lee	13,840.69	23,140.69	313,472.00	9,300.00	327,312.69	336,612.69
Livingston	4,462.83	6,389.23	426,447.34	1,926.40	430,510.17	432,436.57
Logan	184,607.92	184,607.92	332,470.71	---	517,078.63	517,078.63
McDonough	27,619.74	40,423.94	331,013.87	12,804.20	358,633.61	371,437.81
McHenry	2,217.06	3,967.86	70,671.29	1,750.80	72,888.35	74,639.15
McLean	16,611.04	24,443.84	608,669.04	7,832.80	625,280.08	633,112.88
Macon	28,787.19	44,386.30	243,496.60	15,599.20	272,283.79	287,882.99
Macoupin	49,808.02	49,808.02	279,224.36	62,398.66	329,092.58	329,092.58
Madison	95,799.45	158,198.11	108,878.82	---	204,678.27	207,076.93
Marion	3,207.09	3,207.09	38,019.34	3,539.04	41,226.43	41,226.43
Marshall	6,689.01	10,228.09	38,019.34	---	180,664.16	184,203.20
Mason	190,257.34	190,257.34	131,906.51	638.00	322,163.85	322,163.85
Massac	1,089.24	1,727.24	49,695.85	---	50,785.09	51,423.09
Menard	94,421.98	94,421.98	150,497.29	1,143.20	244,919.27	244,919.27
Mercer	3,644.27	4,787.47	380,052.58	---	383,696.85	384,840.05
Montee	174,417.05	174,417.05	53,399.77	---	227,816.82	227,816.82
Montgomery	21,194.35	33,726.75	180,867.02	12,532.40	202,061.37	214,593.77
Morgan	168,354.70	168,354.70	294,358.72	---	462,713.42	462,713.42
Moultrie	11,372.11	11,372.11	178,719.40	---	190,091.51	190,091.51
Ogle	2,395.55	4,396.75	319,850.81	2,000.20	322,246.36	324,246.56
Peoria	13,824.94	21,711.34	415,476.17	7,886.40	429,301.11	437,187.51
Perry	6,277.87	10,436.27	23,516.59	4,158.40	29,794.46	33,952.86
Piatt	29,019.45	50,652.05	500,178.31	21,632.60	229,197.76	250,830.36
Pike	89,007.84	89,007.84	336,278.48	---	425,286.32	425,286.32
Pope	705.52	931.52	13,521.51	226.00	14,227.03	14,453.03
Pulaski	1,223.21	2,319.01	27,796.19	1,095.80	29,019.40	30,115.20
Putnam	7,283.87	9,801.07	77,697.20	2,517.20	84,981.07	87,498.27
Randolph	148,336.01	148,336.01	55,814.53	---	204,150.54	204,150.54
Richland	5,817.52	5,817.52	54,474.80	---	60,292.02	60,292.02
Rock Island	3,243.12	5,043.12	202,621.51	1,800.00	205,864.63	207,094.63
St. Clair	227,285.57	227,285.57	74,860.39	---	302,145.96	302,145.96
Saline	6,924.63	12,408.43	42,191.00	5,483.80	49,115.63	54,599.43
Sangamon	164,693.49	164,693.49	395,620.07	---	560,313.56	560,313.56
Schuyler	30,506.42	51,630.62	162,124.10	21,124.20	192,630.52	213,754.72
Scott	81,967.32	81,967.32	124,737.37	---	206,704.69	206,704.69
Shelby	7,474.02	7,474.02	255,012.37	---	262,486.39	262,486.39
Stark	1,207.22	1,647.62	196,695.15	440.40	197,902.37	198,342.77
Stephenson	1,090.03	1,767.83	273,010.77	707.80	274,070.80	274,778.60
Tazewell	83,752.67	141,543.87	239,271.76	57,791.20	323,024.53	380,815.73
Union	9,179.91	15,759.91	27,381.24	6,579.40	36,561.15	43,140.55

Rental and benefit payments through Dec. 31, 1934—by States and counties—Continued

ILLINOIS—Continued

County	Wheat			Tobacco		Corn-hog, 1934	All commodities			
	1933	1934	Total	1933	1934		Total	1933	1934	Total
Vermilion	\$14,454.80	\$32,059.51	\$46,514.31				\$374,287.45	\$14,454.80	\$406,316.96	\$420,771.76
Wabash	12,137.64	18,566.16	30,703.80				61,215.79	12,137.64	79,781.95	91,919.59
Warren	986.60	3,396.22	4,382.82				401,923.96	986.60	405,320.18	406,306.78
Washington		90,706.87	90,706.87				35,697.29		126,404.16	126,404.16
Wayne	1,141.60	2,409.43	3,551.03				54,062.16	1,141.60	56,471.59	57,613.19
White	18,531.20	22,936.38	41,467.58				97,764.53	18,531.20	120,700.91	139,232.11
Whiteside	19,305.60	33,040.03	52,345.63				380,825.22	19,305.60	413,865.25	433,170.85
Will	17,566.00	31,946.68	49,512.68				179,858.27	17,566.00	211,804.95	229,370.95
Williamson	1,746.20	2,237.26	3,983.46				22,093.65	1,746.20	24,330.91	26,077.11
Winnebago	280.40	466.29	746.69				187,160.08	280.40	187,725.27	188,005.67
Woodford	4,540.00	7,309.48	11,849.48				256,811.67	4,540.00	264,121.15	268,661.15
Total	649,384.29	3,106,796.85	3,756,181.14	\$183.55	705.30	888.85	19,055,875.27	649,567.84	22,163,377.42	22,812,945.26

INDIANA

County	Wheat			Tobacco		Corn-hog, 1934	All commodities			
	1933	1934	Total	1933	1934		Total	1933	1934	Total
Adams	\$7,332.60	\$10,304.36	\$17,636.96				\$128,066.78	\$7,332.60	\$138,371.14	\$145,703.74
Allen	8,802.60	13,215.49	22,018.09				292,489.72	8,802.60	305,705.21	314,507.81
Bartholomew	27,277.60	49,783.06	77,060.66				156,544.40	27,277.60	209,258.22	236,535.82
Benton	3,033.20	6,435.05	9,468.25				276,347.75	3,033.20	282,782.80	285,816.00
Blackford							95,806.02		97,429.27	97,429.27
Boone	7,449.40	14,153.69	21,603.09				372,080.78	7,449.40	356,234.47	393,683.87
Brown		174.53	174.53				14,291.89		15,903.16	15,903.16
Carroll	13,612.80	23,115.57	36,728.37				222,564.95	13,612.80	245,680.52	259,293.32
Cass	11,426.00	21,438.87	32,864.87				311,479.10	11,426.00	332,917.97	344,343.97
Clark		25,025.41	25,025.41				61,724.05		95,211.77	95,211.77
Clay	5,545.40	8,932.58	14,477.98				74,968.62	5,545.40	83,901.20	89,446.60
Clinton	30,439.40	55,235.16	85,674.56				247,786.65	30,439.40	303,021.81	333,461.21
Crawford		1,677.98	1,677.98				12,573.53		14,251.51	14,251.51
Davess	11,776.20	16,402.10	28,178.30				103,404.61	11,776.20	119,820.71	131,596.91

Dearborn.....	2,850.40	4,128.22	6,978.62	5,520.06	5,520.06	17,202.53	2,850.40	26,850.81	29,701.21
Decatur.....	28,959.40	41,399.89	70,359.29	418.76	418.76	246,358.58	28,959.40	288,177.23	317,136.63
De Kalb.....	15,968.84	26,668.00	42,636.93			119,480.03	15,968.84	146,148.12	162,116.96
Delaware.....	13,115.51	23,115.51	20,005.51			227,352.84	6,890.00	247,358.35	247,358.35
Dubuois.....	43,304.63	43,304.63	78,632.23			125,147.10	33,327.60	170,451.73	203,779.33
Elkhart.....	23,843.49	39,380.69	39,380.69			113,002.90	15,537.20	136,846.39	152,383.59
Fayette.....	27,662.81	46,679.21	46,679.21			154,765.47	19,016.40	182,428.28	201,444.68
Floyd.....	1,608.55	1,608.55	1,608.55	385.00	385.00	7,337.73	9,331.28	9,331.28	9,331.28
Fountain.....	32,749.47	47,339.87	47,339.87			163,955.28	14,640.40	196,704.75	211,345.15
Franklin.....	28,213.34	47,739.54	47,739.54	4,576.43	4,576.43	107,674.30	19,526.20	140,464.07	159,990.27
Fulton.....	6,804.00	10,637.09	17,441.09			242,550.96	6,804.00	253,188.05	259,992.05
Gibson.....	22,866.40	31,057.63	53,954.03			155,371.24	22,866.40	186,458.87	209,325.27
Grant.....	6,955.60	14,177.58	23,932.78	70.00	70.00	249,540.79	9,755.20	263,788.37	273,543.57
Greene.....	6,955.60	9,826.48	16,782.08	556.00	556.00	94,597.62	6,955.60	104,980.10	111,935.70
Hamilton.....	13,539.80	24,860.34	38,400.14			243,815.21	13,539.80	268,675.55	282,215.35
Hancock.....	9,777.60	15,684.97	25,462.57			101,297.61	9,777.60	176,982.58	186,760.18
Harrison.....	11,824.25	18,493.45	18,493.45	3,215.90	3,215.90	43,606.31	6,669.20	58,646.46	65,315.66
Hendricks.....	11,457.22	18,198.02	18,198.02	18.00	18.00	261,564.84	6,740.80	273,040.06	279,780.86
Henry.....	26,260.06	41,604.26	41,604.26			244,531.03	15,344.20	270,791.09	286,135.29
Howard.....	30,530.63	30,530.63	30,530.63			205,728.33	236,258.96	236,258.96	236,258.96
Huntington.....	18,791.34	18,791.34	18,791.34			160,032.48	178,823.82	178,823.82	178,823.82
Jackson.....	28,788.00	28,788.00	28,788.00	332.02	332.02	52,885.66	82,005.68	82,005.68	82,005.68
Jasper.....	22,163.01	28,047.01	28,047.01			157,685.68	179,848.69	185,732.69	185,732.69
Jay.....	9,042.24	13,659.04	13,659.04			191,669.15	4,616.80	200,711.39	205,328.19
Jefferson.....	8,151.72	8,151.72	13,981.42	13,913.97	13,913.97	19,554.75	5,829.70	41,620.44	47,450.14
Jennings.....	5,116.43	8,746.23	8,746.23	608.02	608.02	54,175.84	3,629.80	59,900.29	63,530.09
Johnson.....	42,123.37	60,289.77	60,289.77	134.77	134.77	166,452.42	18,166.40	205,710.56	226,876.96
Knox.....	121,852.90	121,852.90	121,852.90			253,269.53	10,687.72	375,122.43	375,122.43
Kosciusko.....	15,729.78	26,427.50	26,427.50			192,347.96	17,811.90	208,976.73	218,775.46
Lagrange.....	30,680.67	48,392.57	48,392.57			98,396.06	7,292.40	128,976.73	146,788.63
Lake.....	12,388.55	19,680.95	19,680.95			87,337.80	99,776.35	99,776.35	99,776.35
LaPorte.....	42,492.47	68,035.77	68,035.77			200,896.89	25,543.30	343,389.36	258,932.66
Lawrence.....	5,368.13	9,100.53	9,100.53	334.03	334.03	89,351.06	95,053.22	98,785.62	98,785.62
Madison.....	22,582.32	38,612.72	38,612.72			359,491.71	382,074.03	398,104.43	398,104.43
Marion.....	13,879.76	13,879.76	13,879.76			67,953.80	81,833.56	81,833.56	81,833.56
Marshall.....	19,910.20	33,193.26	33,193.26			240,306.27	13,283.06	260,216.47	273,499.53
Martin.....	4,109.24	6,877.84	6,877.84			44,402.62	2,708.60	48,511.86	51,280.46
Miami.....	29,915.30	46,969.80	46,969.80	440.74	440.74	186,590.80	16,994.50	216,306.10	233,500.60
Montgomery.....	372.45	372.45	372.45	60.74	60.74	32,970.66	17,537.60	33,783.85	33,783.85
Morgan.....	41,602.95	59,140.55	59,140.55			272,333.90	6,579.40	313,936.85	331,474.45
Montgomery.....	12,896.03	19,475.43	19,475.43			133,375.87	146,332.64	152,912.04	152,912.04
Morgan.....	4,614.20	8,844.00	8,844.00			126,910.64	4,229.80	131,524.84	135,754.64
Newton.....	18,330.50	29,074.90	29,074.90			135,607.59	10,744.40	153,938.09	164,682.49
Noble.....	1,190.20	3,466.76	3,466.76	3,942.06	3,942.06	7,869.39	1,190.20	14,988.01	15,278.21
Ohio.....	2,276.56	8,796.26	8,796.26	390.68	390.68	66,976.95	3,752.40	72,411.49	76,163.89
Orange.....	5,043.86	8,796.26	8,796.26	140.00	140.00	35,040.05	3,860.00	37,171.67	38,031.67
Owen.....	1,991.62	2,851.62	2,851.62			203,681.24	9,748.80	220,883.56	230,632.36
Parke.....	17,202.32	26,931.12	26,931.12			34,826.63	43,117.18	46,870.98	46,870.98
Perry.....	8,290.55	9,498.65	9,498.65			59,969.25	65,995.70	69,467.90	69,467.90
Pike.....	6,026.45	22,136.76	22,136.76			78,520.01	100,656.77	100,656.77	100,656.77
Porter.....	22,136.76	70,147.86	70,147.86			118,243.07	161,929.93	188,390.93	188,390.93
Posey.....	43,086.86	23,508.40	23,508.40			123,030.87	26,461.00	146,539.27	146,539.27
Pulaski.....	23,508.40								

Rental and benefit payments through Dec. 31, 1934—by States and counties—Continued
INDIANA—Continued

County	Wheat		Tobacco		Corn-hog, 1934	All commodities		
	1933	1934	Total	1933	1934	1933	1934	Total
Putnam.....	\$6,894.80	\$15,247.93	\$22,142.73	---	\$236,502.17	\$6,894.80	\$251,786.10	\$258,680.90
Randolph.....	9,599.50	18,597.61	28,197.11	---	250,167.48	10,924.20	270,815.52	281,739.72
Ripley.....	8,695.40	15,215.77	23,911.17	---	46,714.31	8,695.40	62,834.11	71,529.51
Rush.....	44,614.20	77,172.14	121,786.34	---	438,894.63	44,614.20	566,651.54	611,265.74
St. Joseph.....	18,405.00	28,946.92	47,351.92	---	94,371.44	18,405.00	123,518.36	141,923.36
Scott.....	2,427.40	3,539.33	5,966.73	---	29,323.49	2,427.40	33,319.32	35,746.72
Shelby.....	30,765.70	49,966.60	80,732.30	---	275,913.41	30,765.70	325,924.78	356,690.48
Spencer.....	13,758.80	18,781.15	32,539.95	---	46,052.79	13,758.80	66,491.92	80,250.72
Starke.....	---	14,410.96	14,410.96	---	79,612.40	---	94,023.36	94,023.36
Steuben.....	9,271.20	13,598.50	22,869.70	---	133,972.64	9,271.20	147,571.14	156,842.34
Sullivan.....	14,254.20	26,937.06	41,191.26	---	177,049.27	14,254.20	203,986.33	218,240.53
Switzerland.....	2,113.40	2,710.60	4,824.00	---	17,396.51	2,113.40	43,349.06	45,462.46
Tipton.....	27,132.00	47,293.60	74,425.60	---	301,945.09	27,132.00	349,238.69	376,370.69
Union.....	25,421.60	37,324.85	62,746.45	---	294,910.13	11,553.60	307,303.99	318,159.59
Vanderburgh.....	15,212.80	25,378.81	40,791.61	---	119,254.74	25,421.60	156,579.59	182,001.19
Vermillion.....	---	7,304.05	11,973.45	---	39,964.03	15,212.80	65,542.84	80,755.64
Vigo.....	23,262.63	33,346.23	56,608.86	---	100,163.96	4,671.40	106,791.39	111,462.79
Warren.....	12,083.60	33,279.03	45,362.63	---	185,283.40	12,083.60	123,427.59	135,511.19
Washington.....	8,622.40	13,807.09	22,429.49	---	219,837.79	8,622.40	218,562.43	242,267.28
Warrick.....	11,251.80	20,371.40	31,623.20	---	53,689.11	11,251.80	74,060.51	85,312.31
Wayne.....	3,663.80	6,855.06	10,518.86	---	69,360.33	3,663.80	78,352.08	82,015.88
Wells.....	34,807.00	54,770.02	89,577.02	---	286,822.08	34,832.50	321,647.59	356,480.09
White.....	8,592.60	11,728.46	20,321.06	---	275,788.74	---	284,702.52	284,702.52
Whitley.....	8,793.80	12,942.73	21,736.53	---	207,537.43	8,592.60	219,263.89	227,858.89
Total.....	955,383.02	1,940,474.23	2,895,857.25	1,350.20	106,001.35	956,733.22	15,842,977.04	16,799,710.26

IOWA

County	Wheat		Corn-hog, 1934	All commodities		
	Total			1933	1934	Total
	1933	1934				
Adair	\$943.20	\$1,798.22	\$373,829.54	\$943.20	\$375,627.76	\$376,570.96
Adams	428.60	486.59	369,901.46	428.60	370,388.05	370,816.65
Allamakee	561.20	615.32	1,176.52	561.20	179,898.04	180,459.24
Appanoose		1,095.60	124,080.35		125,175.95	125,175.95
Audubon		260.40	505,418.27		505,678.67	505,678.67
Benton	456.20	1,227.17	432,515.08	456.20	433,742.25	434,198.45
Black Hawk		216.48	537,393.38		537,609.86	537,609.86
Boone		1,104.30	319,843.61		320,947.91	320,947.91
Bremer		177.00	215,499.95		215,676.95	215,676.95
Buchanan	215.60	238.98	439,751.47	215.60	439,990.45	440,206.05
Buena Vista		54.97	431,146.21		431,201.18	431,201.18
Butler		24.40	338,353.24		338,357.64	338,357.64
Calhoun		672.37	353,700.93		354,433.30	354,433.30
Calloway		452.40	421,415.49		421,867.89	421,867.89
Carrroll	3,177.20	4,344.56	613,472.81	3,177.20	617,817.37	620,994.57
Cass		1,437.61	418,156.23		419,593.84	419,593.84
Cedar		123.44	311,338.46		311,461.90	311,461.90
Cerro Gordo		54.98	438,634.55		438,689.53	438,689.53
Cherokee		2.40	324,734.48		324,736.88	324,736.88
Chickasaw		233.63	175,263.62		175,497.25	175,497.25
Clarke		42.80	347,448.28		347,491.08	347,491.08
Clay		600.60	540,184.14		540,352.94	540,784.74
Clayton	431.80	108.80	440,270.34	431.80	442,853.70	444,446.90
Clinton	1,593.20	2,583.36	773,986.01	1,593.20	778,338.79	780,703.79
Crawford	2,365.00	4,352.78	389,212.66	2,365.00	410,854.42	417,619.22
Dallas	6,764.80	11,641.76	18,406.56	6,764.80	154,661.97	155,075.97
Davis	414.00	813.84	1,227.84	414.00	195,705.74	195,705.74
Decatur		2,327.51	193,378.23		431,944.94	431,944.94
Delaware		14,927.33	431,944.94		288,971.83	288,971.83
Des Moines		38.20	274,044.50		207,852.91	207,852.91
Dickinson	38.20		207,852.91	38.20	416,801.36	416,872.36
Dubuque	271.00	352.77	416,248.59	271.00	239,986.16	240,563.16
Emmet	577.00	793.37	239,192.79	577.00	432,970.53	432,970.53
Fayette			452,970.53		245,690.07	245,690.07
Floyd		1,005.74	244,684.33		495,850.01	495,850.01
Franklin		479.65	495,370.36		395,991.21	395,991.21
Fremont		34,640.24	360,950.97		340,923.77	340,923.77
Greene		226.20	340,697.57		340,923.77	340,923.77
Grundy		84.29	447,456.80		335,761.15	335,761.15
Guthrie		939.40	334,821.75		614,681.58	614,681.58
Hamilton		347.60	614,333.98		394,629.67	394,629.67
Hancock		94.61	394,535.06		535,459.99	535,459.99
Hardin		113.00	535,346.99		663,914.51	678,899.31
Harrison	14,984.80	18,138.39	645,776.12	14,984.80		

Rental and benefit payments through Dec. 31, 1934—by States and counties—Continued
IOWA—Continued

County	Wheat		Corn-hog, 1934	All commodities		
	1933	1934		1933	1934	Total
Henry.....		\$1, 233. 20	\$333, 839. 03		\$335, 072. 23	\$335, 072. 23
Howard.....		95. 98	170, 401. 26		170, 497. 24	170, 497. 24
Humboldt.....		206. 14	309, 046. 52		309, 252. 66	309, 252. 66
Ida.....		94. 45	519, 747. 89		519, 842. 34	519, 842. 34
Iowa.....	\$881. 40	1, 610. 77	420, 524. 61	\$881. 40	422, 016. 78	422, 016. 78
Jackson.....		1, 016. 28	386, 905. 89		387, 922. 17	387, 922. 17
Jasper.....	4, 477. 40	1, 016. 70	945, 911. 97	4, 477. 40	632, 096. 27	656, 573. 67
Jefferson.....	692. 00	10, 661. 70	243, 334. 22	692. 00	244, 410. 94	245, 102. 94
Johnson.....		1, 708. 72	428, 953. 16		429, 621. 56	429, 621. 56
Jones.....	184. 40	668. 40	340, 241. 14	184. 40	340, 405. 56	340, 589. 96
Koekuk.....	812. 20	2, 160. 33	393, 707. 09	812. 20	395, 055. 22	395, 807. 42
Kossuth.....		146. 91	925, 354. 95		925, 501. 86	925, 501. 86
Lee.....		6, 405. 19	211, 945. 87		218, 351. 06	218, 351. 06
Linn.....	138. 00	501. 27	401, 791. 57	138. 00	402, 154. 84	402, 292. 84
Louis.....	4, 898. 60	14, 397. 76	222, 854. 72	4, 898. 60	232, 353. 88	237, 252. 48
Lucas.....		399. 10	157, 553. 29		157, 952. 39	157, 952. 39
Lyon.....		170. 00	330, 038. 48		330, 228. 48	330, 228. 48
Madison.....	5, 717. 20	21, 721. 93	352, 257. 70	5, 717. 20	368, 262. 43	373, 979. 63
Manaska.....		4, 416. 19	417, 584. 29		422, 000. 48	422, 000. 48
Marion.....	2, 471. 60	3, 938. 59	511, 983. 83	2, 471. 60	515, 942. 42	518, 414. 02
Marshall.....	845. 60	1, 174. 70	492, 231. 61	845. 60	492, 590. 71	493, 426. 31
Mills.....	8, 707. 40	11, 054. 66	472, 093. 77	8, 707. 40	483, 148. 43	491, 855. 83
Mitchell.....		456. 52	336, 010. 94		336, 467. 46	336, 467. 46
Monona.....	52, 147. 60	169, 213. 47	681, 650. 77	52, 147. 60	798, 716. 64	850, 864. 24
Monroe.....	713. 00	2, 265. 30	141, 694. 21	713. 00	143, 246. 51	143, 959. 51
Montgomery.....	4, 885. 20	1, 621. 22	333, 167. 86	4, 885. 20	334, 789. 08	339, 674. 28
Muscatine.....	2, 434. 20	1, 104. 20	223, 543. 77	2, 434. 20	226, 652. 97	229, 087. 17
O'Brien.....	121. 40	24. 36	571, 852. 74	121. 40	571, 877. 10	571, 998. 50
Osceola.....		32, 570. 10	224, 978. 90		224, 978. 90	224, 978. 90
Page.....		156. 89	574, 103. 19		606, 673. 29	606, 673. 29
Palo Alto.....	116. 40	2, 773. 51	351, 900. 49	116. 40	352, 057. 38	352, 173. 78
Plymouth.....	1, 942. 20	4, 721. 71	511, 709. 72	1, 942. 20	514, 489. 23	516, 431. 43
Pocahontas.....		787. 55	385, 232. 75		386, 020. 30	386, 020. 30
Polk.....	13, 291. 40	39, 092. 72	338, 658. 11	13, 291. 40	364, 459. 43	377, 750. 83
Pottawattamie.....		25, 801. 32	710, 904. 74		724, 480. 49	724, 480. 49
Poweshiek.....		13, 575. 75	579, 346. 10		579, 699. 47	579, 699. 47
Ringgold.....	252. 00	1, 773. 39	330, 521. 81	252. 00	332, 295. 20	332, 295. 20
Sac.....		188. 60	422, 078. 52		422, 267. 12	422, 267. 12

	7, 203. 60	10, 588. 84	17, 792. 44	301, 127. 85	7, 203. 60	311, 716. 69	318, 920. 29
Scott.....	1, 055. 11	1, 055. 11	1, 055. 11	463, 168. 97	---	464, 224. 08	464, 224. 08
Shelby.....	838. 64	838. 64	838. 64	701, 190. 31	---	702, 028. 95	702, 028. 95
Stoux.....	683. 31	683. 31	683. 31	620, 470. 56	768. 60	621, 155. 87	621, 155. 87
Story.....	207. 10	207. 10	207. 10	471, 041. 18	454. 80	471, 248. 28	471, 248. 28
Tama.....	4, 469. 79	4, 469. 79	4, 469. 79	471, 760. 33	---	476, 230. 12	476, 230. 12
Taylor.....	735. 94	735. 94	735. 94	290, 424. 19	491. 00	291, 651. 13	291, 651. 13
Union.....	1, 534. 23	1, 534. 23	1, 534. 23	168, 783. 24	---	170, 317. 63	170, 317. 63
Van Buren.....	7, 469. 34	7, 469. 34	7, 469. 34	186, 808. 29	760. 80	189, 112. 43	189, 112. 43
Wapello.....	17, 110. 45	17, 110. 45	17, 110. 45	342, 145. 27	4, 834. 80	343, 277. 63	343, 277. 63
Warren.....	1, 466. 33	1, 466. 33	1, 466. 33	595, 975. 62	9, 373. 80	596, 629. 52	596, 629. 52
Washington.....	775. 38	775. 38	775. 38	192, 177. 09	---	192, 952. 47	192, 952. 47
Wayne.....	889. 61	889. 61	889. 61	552, 683. 81	---	553, 573. 42	553, 573. 42
Webster.....	525. 31	525. 31	525. 31	241, 801. 39	---	241, 801. 39	241, 801. 39
Winnemago.....	23, 102. 51	23, 102. 51	23, 102. 51	766, 627. 80	---	767, 712. 52	767, 712. 52
Winnebek.....	53. 62	53. 62	53. 62	198, 446. 46	18, 258. 00	199, 988. 31	199, 988. 31
Woodbury.....	199. 96	199. 96	199. 96	521, 201. 17	---	521, 401. 13	521, 401. 13
Wright.....	---	---	---	---	---	---	---
Total.....	181, 096. 40	446, 663. 43	627, 759. 83	39, 413, 046. 05	181, 096. 40	39, 859, 709. 48	40, 040, 805. 88

KANSAS

County	Cotton			Wheat		Tobacco, 1934	Corn-hog, 1934	All commodities		
	1933	1934	Total	1933	1934			1933	1934	Total
Allen.....	---	---	---	\$5, 841. 40	\$11, 842. 07	---	\$50, 977. 77	\$5, 841. 40	\$66, 978. 44	\$72, 819. 84
Anderson.....	---	---	---	3, 615. 20	10, 834. 07	---	92, 626. 41	3, 615. 20	99, 845. 28	103, 460. 48
Atchison.....	---	---	---	49, 063. 15	74, 201. 95	\$202. 00	120, 097. 71	23, 138. 80	169, 362. 86	194, 501. 66
Barber.....	---	---	---	508, 753. 56	508, 753. 56	---	44, 813. 34	---	553, 566. 90	553, 566. 90
Barton.....	---	---	---	667, 110. 09	1, 119, 808. 49	---	26, 671. 78	452, 698. 40	693, 781. 87	1, 146, 480. 27
Bourbon.....	---	---	---	1, 764. 08	3, 254. 88	---	80, 355. 21	1, 490. 20	82, 119. 89	83, 610. 09
Brown.....	---	---	---	63, 677. 86	99, 305. 66	---	206, 119. 57	35, 627. 80	269, 797. 43	305, 425. 23
Butler.....	---	---	---	70, 315. 89	70, 315. 89	---	108, 713. 30	---	179, 029. 19	179, 029. 19
Chase.....	---	---	---	18, 224. 50	29, 750. 70	---	41, 194. 78	11, 526. 20	59, 419. 28	70, 945. 48
Chautauqua.....	---	---	---	5, 525. 84	5, 525. 84	---	31, 859. 82	---	37, 421. 66	37, 421. 66
Cheerokee.....	---	---	---	88, 328. 61	131, 235. 81	---	56, 263. 89	42, 907. 20	144, 592. 50	187, 499. 70
Cheyenne.....	---	---	---	262, 205. 58	262, 205. 58	---	128, 809. 78	---	391, 015. 36	391, 015. 36
Clark.....	---	---	---	547, 377. 56	547, 377. 56	---	10, 841. 06	---	558, 218. 62	558, 218. 62
Clay.....	---	---	---	347, 167. 93	347, 167. 93	---	108, 848. 11	---	456, 016. 04	456, 016. 04
Cloud.....	---	---	---	367, 400. 78	367, 400. 78	---	104, 665. 09	---	472, 065. 87	472, 065. 87
Coffey.....	---	---	---	13, 957. 89	24, 425. 09	---	95, 933. 50	10, 467. 20	109, 891. 39	120, 338. 59
Comanche.....	---	---	---	276, 202. 44	457, 380. 04	---	16, 981. 48	181, 177. 60	293, 183. 92	474, 361. 52
Cowley.....	---	---	---	75, 626. 16	115, 625. 36	---	122, 558. 18	40, 099. 20	198, 084. 34	238, 183. 54
Crawford.....	---	---	---	46, 030. 79	69, 323. 79	---	95, 186. 89	23, 293. 00	141, 217. 68	164, 510. 68
Decatur.....	---	---	---	437, 183. 75	437, 183. 75	---	118, 792. 47	---	555, 976. 22	555, 976. 22

Rental and benefit payments through Dec. 31, 1934—by States and counties—Continued

KANSAS—Continued

County	Cotton		Wheat		Tobacco, 1934	Corn-hog, 1934	All commodities		
	1933	1934	Total	1933			1933	1934	Total
Dickinson.....			\$575,934.71	\$38,380.20	.....	\$115,629.56	\$38,380.20	\$653,184.07	\$991,564.27
Doniphan.....			28,087.76	12,592.00	.....	141,327.60	12,592.00	158,193.36	170,791.36
Douglas.....			42,681.17	16,115.40	.....	104,980.70	16,115.40	131,546.47	147,661.87
Edwards.....			747,908.00	291,342.77	.....	24,442.30	291,342.77	481,007.53	772,350.30
Elk.....			7,008.15	2,851.20	.....	50,603.08	2,851.20	54,760.03	57,611.23
Ellis.....			903,422.78	355,927.00	.....	23,246.62	355,927.00	570,742.40	926,669.40
Ellsworth.....			393,364.92	.....	.....	29,881.75	.....	423,246.67	423,246.67
Finney.....			393,364.92	262,729.00	.....	27,019.86	262,729.00	435,085.12	697,824.12
Ford.....			670,804.26	523,494.91	.....	13,002.44	523,494.91	796,706.88	1,320,201.79
Franklin.....			1,307,199.35	6,064.60	.....	134,225.00	6,064.60	151,584.84	1,584,848.14
Geary.....			17,359.84	.....	.....	47,657.57	.....	128,877.38	128,877.38
Gove.....			81,219.81	.....	.....	24,464.59	.....	523,443.71	523,443.71
Graham.....			498,979.12	.....	.....	73,868.05	.....	480,812.77	480,812.77
Grant.....			406,944.72	223,261.80	.....	20,276.49	223,261.80	387,928.75	611,190.55
Gray.....			590,914.06	362,539.60	.....	24,975.80	362,539.60	649,904.82	1,012,444.42
Greenwood.....			987,468.62	.....	.....	15,773.71	.....	202,234.89	1,209,703.41
Greeley.....			186,461.18	.....	.....	84,484.15	.....	87,870.96	274,345.13
Hamilton.....			3,386.81	90,073.60	.....	13,160.05	90,073.60	152,781.52	242,855.12
Harper.....			229,695.07	.....	.....	53,355.91	.....	705,773.29	705,773.29
Harvey.....			632,417.38	.....	.....	49,111.23	.....	375,637.00	375,637.00
Haskell.....			326,525.77	285,776.20	.....	7,252.19	285,776.20	498,052.46	783,828.66
Hodgeman.....			776,576.47	267,513.40	.....	9,001.62	267,513.40	408,743.16	676,256.56
Jackson.....			667,254.94	13,148.40	.....	183,296.64	13,148.40	207,532.94	220,681.34
Jefferson.....			37,384.70	.....	.....	153,078.44	.....	217,074.54	217,074.54
Jewell.....			63,465.25	.....	.....	187,875.54	.....	382,119.15	382,119.15
Johnson.....			194,243.61	9,992.20	.....	116,950.86	9,992.20	133,242.50	143,234.70
Kearny.....			26,283.84	.....	.....	14,012.44	.....	223,479.36	223,479.36
Kingman.....			209,466.92	.....	.....	43,355.63	.....	722,200.38	722,200.38
Kiowa.....			678,844.75	235,340.60	.....	26,795.69	235,340.60	433,510.79	668,851.39
Labette.....			406,715.10	22,572.00	.....	76,460.53	22,572.00	120,620.02	143,192.02
Lane.....			66,731.49	198,112.00	.....	15,721.30	198,112.00	367,999.34	566,111.34
Leavenworth.....			590,390.04	.....	.....	91,396.86	.....	148,649.60	148,649.60
Lincoln.....			56,359.88	.....	.....	32,777.13	.....	497,321.19	497,321.19
Linn.....			464,544.06	.....	.....	99,746.03	.....	112,565.94	117,352.54
Logan.....			16,912.51	4,816.60	.....	30,251.75	4,816.60	193,004.37	193,004.37
Lyon.....			162,752.62	.....	.....	157,157.40	.....	181,579.57	193,470.57
McPherson.....			24,422.17	11,891.00	.....	63,522.13	11,891.00	549,865.84	824,668.74
Marion.....			36,313.17	274,802.90	.....	69,951.78	274,802.90	459,148.01	459,148.01
.....			761,146.61	.....	.....	.....	.....	.....	.....
.....			389,196.23	.....	.....	.....	.....	.....	.....

Marshall	51,151.00	87,095.05	138,246.05	282,902.06	51,151.00	369,997.11	421,148.11
Meade	279,491.80	460,201.99	739,693.79	12,680.32	279,491.80	472,882.31	752,374.11
Miami	4,301.60	10,447.85	14,748.95	152,989.77	4,301.60	103,447.12	167,748.72
Michell	237,880.40	374,293.93	612,174.33	54,383.04	237,880.40	428,676.97	666,557.37
Montgomery	22,711.53	35,634.08	58,346.21	57,120.93	25,763.53	93,399.19	119,162.72
Morris	24,879.00	46,939.91	71,818.91	116,143.83	24,879.00	163,083.74	187,962.74
Morton	369,796.36	369,796.36	369,796.36	7,355.38	369,796.36	377,151.74	377,151.74
Nemaha	33,045.17	33,045.17	33,045.17	251,706.01	33,045.17	284,751.18	284,751.18
Neosho	29,304.57	29,304.57	29,304.57	79,105.54	29,304.57	126,078.71	126,078.71
Ness	497,460.67	497,460.67	497,460.67	15,262.15	497,460.67	512,722.82	848,514.82
Norton	245,198.82	245,198.82	245,198.82	132,927.59	245,198.82	378,126.41	378,126.41
Osage	8,687.34	8,687.34	12,648.94	153,140.60	8,687.34	161,827.94	165,789.54
Osborne	554,475.63	554,475.63	554,475.63	66,801.64	554,475.63	621,367.27	621,367.27
Ottawa	461,643.53	461,643.53	461,643.53	49,335.33	461,643.53	510,978.86	510,978.86
Pawnee	652,536.23	652,536.23	1,094,451.03	21,273.23	652,536.23	673,809.48	1,075,724.28
Phillips	165,205.81	165,205.81	165,205.81	134,936.90	165,205.81	300,142.71	300,142.71
Pottawatomie	44,829.44	44,829.44	44,829.44	252,151.37	44,829.44	300,142.71	300,142.71
Pratt	901,624.18	901,624.18	901,624.18	36,504.68	901,624.18	938,128.86	938,128.86
Rawlins	630,875.61	630,875.61	630,875.61	83,358.03	630,875.61	714,233.64	714,233.64
Reno	782,215.98	782,215.98	782,215.98	92,284.16	782,215.98	874,480.16	1,360,736.06
Republic	61,984.90	61,984.90	101,774.70	187,749.68	61,984.90	249,734.56	289,524.36
Rice	601,351.95	601,351.95	601,351.95	62,031.12	601,351.95	663,383.07	663,383.07
Riley	35,776.68	35,776.68	60,059.88	104,274.92	35,776.68	140,051.60	164,334.80
Rooks	486,113.18	486,113.18	486,113.18	58,581.24	486,113.18	544,694.42	544,694.42
Rush	1,053,852.91	1,053,852.91	1,053,852.91	12,868.61	1,053,852.91	1,066,721.52	1,066,721.52
Russell	762,713.19	762,713.19	762,713.19	32,282.65	762,713.19	794,995.84	794,995.84
Saline	365,077.85	365,077.85	382,406.65	52,731.37	365,077.85	417,809.22	635,136.02
Scott	173,834.76	173,834.76	287,397.56	17,729.20	173,834.76	191,563.96	305,126.76
Sedgwick	679,780.34	679,780.34	679,780.34	134,502.32	679,780.34	814,282.66	814,282.66
Seward	286,873.95	286,873.95	460,188.95	11,102.53	286,873.95	297,976.48	471,291.48
Shawnee	30,373.62	30,373.62	30,373.62	130,618.30	30,373.62	160,991.92	160,991.92
Sheridan	532,045.98	532,045.98	532,045.98	58,727.91	532,045.98	590,773.89	590,773.89
Sherman	320,051.99	320,051.99	320,051.99	93,251.32	320,051.99	413,303.31	413,303.31
Smith	203,715.67	203,715.67	203,715.67	169,240.32	203,715.67	372,955.99	372,955.99
Stafford	558,025.78	558,025.78	847,730.18	49,333.00	558,025.78	607,358.78	897,063.18
Stanton	286,505.89	286,505.89	443,360.09	10,599.03	286,505.89	297,104.92	453,939.12
Stevens	245,620.00	245,620.00	419,856.80	8,632.95	245,620.00	254,252.95	428,489.75
Sumner	679,513.47	679,513.47	679,513.47	105,908.54	679,513.47	785,422.01	785,422.01
Thomas	742,266.96	742,266.96	742,266.96	67,952.22	742,266.96	810,219.18	810,219.18
Trego	646,972.20	646,972.20	646,972.20	27,989.20	646,972.20	674,961.40	674,961.40
Wabunsee	26,586.20	26,586.20	44,538.80	89,667.87	26,586.20	116,254.07	134,206.67
Wallace	55,913.72	55,913.72	55,913.72	28,582.70	55,913.72	84,496.42	84,496.42
Washington	157,978.81	157,978.81	157,978.81	210,199.49	157,978.81	368,178.30	368,178.30
Wichita	175,410.68	175,410.68	175,410.68	22,753.83	175,410.68	198,164.51	198,164.51
Wilson	19,504.20	19,504.20	32,856.20	58,343.88	19,504.20	77,848.08	91,200.08
Woodson	6,479.95	6,479.95	12,495.35	42,581.38	6,479.95	49,061.33	55,076.73
Wyandotte	4,378.71	4,378.71	5,824.91	14,814.22	4,378.71	19,192.93	20,639.13
Total	7,437,059.01	30,397,631.28	37,834,690.29	8,037,892.94	7,440,111.01	38,439,929.51	45,880,040.52

Rental and benefit payments through Dec. 31, 1934—by States and counties—Continued

KENTUCKY

County	Cotton			Wheat		Tobacco, 1934	Corn-hog, 1934	All commodities		
	1933	1934	Total	1933	1934			Total		
Adair.....			\$2,368.11	\$2,368.11	\$15,713.40	\$33,389.92		\$51,471.43	\$51,471.43	
Allen.....			275.88	275.88	12,612.28	22,929.84		35,818.00	35,818.00	
Anderson.....			397.60	648.59	24,860.58	3,625.08		397.60	29,531.85	
Ballard.....			1,397.20	2,919.70	14,689.99	37,132.41		1,397.20	53,344.90	
Barren.....			2,363.94	2,363.94	80,372.68	40,939.23			123,675.85	
Bath.....			549.40	194.65	46,863.92	9,804.58		549.40	56,923.15	
Bell.....						851.35			57,472.55	
Boone.....			671.88	671.88	23,254.37	16,533.41		290.00	40,749.66	
Bourbon.....			7,241.23	7,241.23	81,844.05	45,589.43		3,946.20	138,620.91	
Boyd.....					26.00	3,106.45			3,132.45	
Boyle.....			4,320.70	7,746.50	35,969.35	16,385.68		3,425.80	60,111.53	
Bracken.....			1,180.68	2,148.68	57,594.85	1,309.06		968.00	61,052.59	
Breathitt.....					180.00				180.00	
Breckenridge.....			3,048.71	3,048.71	43,286.35	36,376.55			82,711.61	
Bullitt.....			1,744.40	2,870.60	8,260.62	17,558.87		1,126.20	28,690.09	
Butler.....			377.80	377.80	1,518.16	26,372.05			26,372.05	
Caldwell.....			638.20	1,072.00	6,344.44	7,947.48		433.80	15,363.92	
Calloway.....	\$14.00				24,418.52	15,214.26		328.80	40,517.65	
Campbell.....			440.87	870.87	3,323.79	1,525.06		171.60	5,289.04	
Carlisle.....			268.59	440.19	4,039.20	46,791.27		316.80	51,058.13	
Carroll.....			227.66	544.46	28,202.55	7,264.33		660.20	37,046.90	
Carter.....			919.82	1,580.02	18,851.17	269.20		19,120.37	31,730.85	
Casey.....			50.50	103.50	22,694.15	8,953.20		53.00	31,730.85	
Christian.....			20,725.62	20,725.62	58,535.81	36,015.20		115,276.63	115,276.63	
Clark.....			6,215.09	6,215.09	57,289.70	20,103.46		83,608.25	83,608.25	
Clay.....					7,638.09	4,281.20		11,919.29	11,919.29	
Clinton.....			50.50	183.70	4,841.72	10,299.40		133.20	15,324.82	
Crittenden.....			223.98	302.58	823.85	26,466.41		78.60	27,592.84	
Cumberland.....					11,937.02	22,457.50		34,394.52	34,394.52	
Daviess.....			9,358.84	18,256.04	79,949.46	52,496.73		141,805.05	150,702.25	
Edmonson.....					4,922.57	14,978.31		8,897.20	19,900.88	
Elliott.....					3,985.31	113.25			4,098.56	
Estill.....					2,832.26	1,430.39			4,262.65	
Fayette.....			3,169.77	5,815.57	86,872.00	20,001.76		2,645.80	112,689.33	
Fleming.....			1,750.08	3,166.88	62,648.78	12,914.87		1,416.80	78,730.53	
Floyd.....						3,768.20			3,768.20	
Franklin.....			1,508.39	2,642.99	44,871.53	8,798.38		1,134.60	56,312.90	
Fulton.....			3,366.30	6,845.70	1,558.41	38,333.65		45,330.40	125,088.63	
	41,851.00	\$36,499.87	78,350.87							

Gallatin	134.00	244.70	378.70	17,525.30	4,499.03	134.00	22,259.03	22,403.03
Garrard	933.00	2,080.80	2,993.80	43,776.12	20,155.76	933.00	65,992.68	66,925.68
Grant	486.60	554.12	1,040.72	42,893.54	7,626.75	486.60	51,074.41	51,961.01
Graves	747.80	736.35	1,484.15	35,772.27	43,601.01	747.80	80,109.63	80,887.43
Grayson		4,384.70	1,746.10	17,075.21	19,682.21		41,142.29	41,142.29
Green		1,746.10		23,481.64	11,447.06		36,674.80	36,674.80
Greenup				10,244.17	2,001.20		12,245.37	12,245.37
Hancock	1,175.40	1,487.37	2,662.77	15,560.43	8,216.12	1,175.40	25,263.92	26,439.32
Hardin	1,481.80	1,909.91	3,391.71	19,297.12	37,653.75	1,481.80	58,860.78	60,342.58
Harrison		4,377.95	4,377.95	85,544.37	15,767.76		105,690.08	105,690.08
Hart				44,143.98	9,214.60		53,358.58	53,358.58
Henderson	1,540.20	2,226.28	3,766.48	19,975.81	93,406.60	1,540.20	115,698.69	117,238.89
Henry		2,703.46	2,703.46	56,731.67	21,386.65		80,821.78	80,821.78
Hickman	5,783.44	1,843.31	3,345.91	4,943.79	65,638.01	5,783.44	77,828.55	79,351.15
Hopkins		2,603.45	3,429.05	7,499.57	19,103.07		29,266.09	30,031.69
Jackson				7,366.06			7,366.06	7,366.06
Jefferson	4,297.40	4,939.18	9,266.58	3,000.51	7,546.36	4,297.40	15,516.05	19,813.45
Jessamine	4,909.40	5,203.31	10,118.71	56,163.55	16,912.18	4,909.40	78,285.04	83,194.44
Johnson				292.00	1,383.80		1,675.50	1,675.50
Kenton	119.60	216.46	336.06	10,554.88	2,923.41	119.60	13,694.75	13,814.35
Knoft					1,025.85		1,025.85	1,025.85
Knox				2,344.96			2,344.96	2,344.96
Larue	692.00	1,063.97	1,755.97	13,591.54	22,487.51	692.00	39,123.02	39,815.02
Laurel				7,974.19	2,132.75		8,106.94	8,106.94
Lawrence				530.00	2,213.70		2,743.70	2,743.70
Lee				538.00	4,393.96		4,931.96	4,931.96
Lewis	14.80	301.39	316.19	26,794.13	3,118.30	14.80	30,213.82	30,228.62
Lincoln	1,954.80	365.30	2,320.10	41,601.94	21,179.27	1,954.80	63,146.51	65,101.31
Livingston	173.40	243.53	416.93	863.85	45,438.91	173.40	46,566.29	46,739.69
Logan	7,954.20	8,347.42	16,301.62	53,666.30	35,291.28	7,954.20	97,305.00	105,259.20
Lyon		733.37	733.37	6,129.56	20,418.95		27,281.88	27,281.88
McCracken	142.80	393.60	506.70	13,103.29	13,103.29	142.80	18,860.79	19,003.59
McLean	1,252.40	1,440.94	2,693.34	20,781.61	23,146.43	1,252.40	45,368.98	46,621.38
Madison	515.80	604.25	1,120.05	54,884.63	25,094.53	515.80	80,283.38	80,799.18
Magoffin				2,241.43	2,778.35		5,019.78	5,019.78
Marion				28,037.06	24,990.69		56,035.03	56,035.03
Marshall	705.00	3,007.28	3,007.28	922.04	13,000.28	705.00	23,319.30	24,024.30
Mason		10,552.78	10,552.78	61,992.95	16,021.95		88,567.68	88,567.68
Meade	2,041.80	3,699.23	5,741.03	8,764.95	15,995.62	2,041.80	28,459.81	30,501.61
Menifee				4,127.78			4,127.78	4,127.78
Mercer	5,905.20	4,976.65	10,881.85	50,999.00	21,676.68	5,905.20	77,652.33	83,557.53
Metcalle	250.20	258.94	509.14	29,205.40	11,377.91	250.20	40,842.25	41,092.45
Monroe	529.60	135.34	664.94	18,654.07	21,880.39	529.60	40,669.80	41,199.40
Montgomery	382.20	338.65	940.85	47,290.10	8,579.40	382.20	56,228.15	56,810.35
Morgan				13,812.00	1,264.00		17,076.00	17,076.00
Muhlenberg	665.80	269.48	935.28	8,826.75	11,475.46	665.80	20,571.69	21,237.49
Nelson	4,559.00	4,782.25	9,341.25	27,925.65	49,327.50	4,559.00	82,035.40	86,594.40
Nicholas		1,680.89	1,680.89	51,672.53	10,012.74		63,366.21	63,366.21
Ohio	424.40	808.57	1,232.97	16,173.76	21,772.60	424.40	38,754.93	39,179.33
Oldham	2,428.00	2,635.17	5,063.17	8,706.03	18,850.62	2,428.00	30,191.82	32,619.82
Owen	326.40	417.46	743.86	56,571.50	4,168.55	326.40	61,157.51	61,483.91
Owsley				1,998.02	1,704.04		3,702.06	3,702.06

Rental and benefit payments through Dec. 31, 1934—by States and counties—Continued
 KENTUCKY—Continued

County	Cotton			Wheat		Tobacco, 1934	Corn-hog, 1934	All commodities		
	1933	1934	Total	1933	1934			Total		
Pendleton										
Perry										
Pike										
Powell										
Pulaski										
Robertson										
Rockcastle										
Rowan										
Russell										
Scott										
Shelby										
Simpson										
Spencer										
Taylor										
Todd										
Trigg										
Trimble										
Union										
Warren										
Washington										
Wayne										
Webster										
Whitley										
Wolfe										
Woodford										
Total	\$41,865.00	\$42,283.31	\$84,148.31	111,560.80	212,506.06	324,066.86	2,783,875.29	2,021,836.22	153,425.80	5,060,500.88

LOUISIANA

County	Cotton			Corn-hog, 1934	Sugar, 1934	All commodities		
	1933	1934	Total			1933	1934	Total
Acadia.....	\$90,907.48	\$115,643.20	\$206,550.68	\$903.50		\$90,907.48	\$116,546.70	\$207,454.18
Allen.....	18,513.86	16,468.07	34,981.93			18,513.86	16,468.07	34,981.93
Ascension.....	574.50	64.51	639.01	892.05		574.50	966.56	1,531.06
Assumption.....				569.40			569.40	569.40
Avoynes.....	151,622.17	177,252.29	328,874.46	43.00		151,622.17	177,255.29	328,917.46
Beauregard.....	16,685.92	12,110.07	28,795.99	839.70		16,685.92	12,949.77	29,635.69
Bienville.....	164,169.96	144,971.38	309,141.34	135.65		164,169.96	145,107.03	309,276.99
Bossier.....	180,549.22	215,591.03	396,140.25			180,549.22	215,591.03	396,140.25
Caddo.....	297,440.00	415,064.07	712,504.07			297,440.00	415,064.07	712,504.07
Calcasieu.....	24,532.00	17,408.89	41,940.89			24,532.00	17,408.89	41,940.89
Caldwell.....	70,677.68	43,902.89	114,580.57			70,677.68	43,902.89	114,580.57
Cameron.....	23,804.00	19,780.19	43,584.19			23,804.00	19,780.19	43,584.19
Catahoula.....	109,973.50	80,628.98	190,602.48			109,973.50	80,628.98	190,602.48
Clabornne.....	202,924.04	239,559.63	442,483.67	525.50		202,924.04	240,085.13	443,009.17
Concordia.....	89,977.35	56,089.38	146,066.73			89,977.35	56,089.38	146,066.73
DeSoto.....	163,767.00	168,680.51	332,447.51	305.80		163,767.00	168,986.31	332,753.31
East Baton Rouge.....	14,600.17	20,721.29	35,321.46	6,228.25		14,600.17	26,949.54	41,549.71
East Carroll.....	132,141.75	189,976.95	322,118.70			132,141.75	189,976.95	322,118.70
East Feliciana.....	41,686.50	39,387.75	81,074.25	834.25		41,686.50	40,222.00	81,908.50
Evangeline.....	129,729.88	121,334.96	251,064.84			129,729.88	121,334.96	251,064.84
Franklin.....	271,370.25	330,053.37	601,423.62			271,370.25	330,053.37	601,423.62
Grant.....	53,994.62	44,680.55	98,675.17			53,994.62	44,680.55	98,675.17
Grebe.....	7,126.64	7,663.57	14,822.21	1,137.05		7,126.64	8,832.62	15,959.26
Iberville.....	176.00	266.48	442.48			176.00	666.88	832.88
Jackson.....	60,843.00	62,706.59	123,549.59	224.85		60,843.00	62,931.44	123,774.44
Jefferson Davis.....	31,988.53	24,535.74	56,524.27			31,988.53	24,535.74	56,524.27
Lafayette.....	101,929.33	117,974.97	219,904.30			101,929.33	117,974.97	219,904.30
Latourche.....		4,322.94	4,322.94	2,708.80	\$26,678.80		33,710.54	33,710.54
LeSalle.....	8,972.05	4,880.55	13,852.60	16.00		8,972.05	4,896.55	13,868.60
Lincoln.....	168,447.89	166,608.41	335,056.30	2,338.25		168,447.89	168,946.66	337,394.55
Livingston.....	1,696.60	1,266.98	2,963.48			1,696.60	2,983.48	2,983.48
Madison.....	117,887.00	103,786.03	221,673.03	812.60		117,887.00	104,598.63	222,485.63
Morehouse.....	176,044.41	145,225.01	321,269.42			176,044.41	145,225.01	321,269.42
Natchitoches.....	213,948.30	186,387.86	400,336.16	30.00		213,948.30	186,417.86	400,366.16
Orleans.....	102,024.50	85,362.85	187,387.35			102,024.50	85,362.85	187,387.35
Ouachita.....	56,540.40	60,725.41	117,265.81	4,201.05		56,540.40	64,926.46	121,466.86
Poivre.....	140,497.50	136,548.20	277,045.70	1,945.05		140,497.50	138,493.25	278,990.75
Rapides.....	137,654.00	123,892.90	261,546.90			137,654.00	123,892.90	261,546.90
Red River.....	237,422.75	203,082.05	440,504.80			237,422.75	203,082.05	440,504.80
Richland.....	74,473.30	64,939.47	139,412.77	91.50		74,473.30	65,030.97	139,504.27
Sabine.....		13,883.16	13,883.16				13,883.16	13,883.16
St. Helena.....	19,300.54		33,183.70	34.50		19,300.54	34.50	34.50
St. James.....				696.50			696.50	696.50
St. John the Baptist.....								

Rental and benefit payments through Dec. 31, 1934—by States and counties—Continued

LOUISIANA—Continued

County	Cotton		Corn-hog, 1934	Sugar, 1934	All commodities	
	1933	1934			1933	1934
St. Landry	\$244, 264. 38	\$273, 064. 60	\$1, 408. 90		\$244, 264. 38	\$274, 473. 50
St. Martin	38, 428. 43	31, 102. 08			38, 428. 43	31, 102. 08
St. Mary	1, 132. 44	1, 132. 71	419. 00		1, 132. 44	1, 612. 71
St. Tammany	6, 854. 00	3, 133. 79			6, 854. 00	3, 133. 79
Tangipahoa	25, 731. 00	13, 028. 69			25, 731. 00	13, 028. 69
Tensas	113, 839. 72	128, 471. 41			113, 839. 72	128, 471. 41
Terrebonne			995. 65	\$20, 070. 50		21, 066. 15
Union	129, 310. 00	157, 139. 41	240. 20		129, 310. 00	157, 379. 61
Vermilion	44, 701. 75	63, 375. 03	2, 893. 00		44, 701. 75	66, 288. 03
Vernon	52, 667. 69	29, 393. 24	2, 245. 85		52, 667. 69	29, 639. 09
Washington	66, 895. 50	76, 623. 94			66, 895. 50	76, 623. 94
Webster	142, 419. 00	139, 135. 11			142, 419. 00	139, 135. 11
West Baton Rouge	4, 085. 00	5, 034. 30	325. 35		4, 085. 00	1, 274. 65
West Carroll	128, 137. 87	105, 538. 22			128, 137. 87	105, 538. 22
West Feliciana	16, 361. 67	13, 471. 52			16, 361. 67	15, 471. 52
Winn	48, 400. 00	46, 435. 85			48, 400. 00	46, 435. 85
Total	4, 969, 842. 94	5, 067, 537. 03	32, 431. 60	46, 749. 30	4, 969, 842. 94	5, 146, 717. 93
						10, 116, 560. 87

MAINE

County	Corn-hog, 1934 ¹	Total
Cumberland	\$2, 006	\$2, 006
Total	2, 006	2, 006

¹ No rental and benefit payments for 1933.

MARYLAND

County	Wheat			Tobacco, 1934	Corn-hog, 1934	All commodities		
	1933	1934	Total			1933	1934	Total
Allegany.....	\$1,856.80	\$2,782.55	\$4,639.35	-----	\$584.70	\$1,856.80	\$3,367.25	\$5,224.05
Anne Arundel.....	283.20	959.15	1,242.35	-----	1,578.90	283.20	9,281.90	9,565.01
Baltimore.....	17,109.00	25,290.93	42,399.93	-----	16,806.45	17,109.00	42,097.38	59,206.38
Calvert.....	1,708.60	1,962.42	2,671.02	-----	317.57	7,708.60	6,606.31	7,314.91
Caroline.....	24,199.10	41,566.29	65,765.39	-----	11,915.23	24,199.10	53,481.52	77,680.62
Carroll.....	43,953.40	63,962.59	109,915.99	-----	24,151.44	43,953.40	90,170.03	134,123.43
Cecil.....	20,712.60	37,903.55	58,616.15	-----	7,851.54	20,712.60	43,755.09	66,467.69
Charles.....	3,408.60	6,186.06	9,594.66	-----	1,197.50	3,408.60	12,154.18	15,562.78
Dorchester.....	27,493.30	40,255.68	67,748.98	-----	7,274.15	27,493.30	47,529.83	75,023.13
Frederick.....	95,325.80	142,664.48	237,990.28	200.00	33,342.61	95,325.80	176,207.09	271,532.89
Garrett.....	673.40	877.55	1,550.95	-----	837.55	673.40	1,615.10	2,388.50
Harford.....	9,267.60	16,689.51	25,957.11	-----	8,572.73	9,267.60	25,262.24	34,529.84
Howard.....	16,538.40	22,399.65	38,938.05	-----	10,171.54	16,538.40	32,571.19	49,109.59
Kent.....	50,308.70	71,113.87	121,422.57	-----	21,999.17	50,308.70	93,113.04	143,421.74
Montgomery.....	36,761.80	74,024.67	110,786.47	226.00	29,756.26	36,761.80	104,006.93	140,768.73
Prince Georges.....	3,791.20	4,129.67	7,920.87	15,716.38	1,015.35	3,791.20	20,861.40	24,652.60
Queen Annes.....	52,780.00	78,689.23	131,469.23	-----	18,698.04	52,780.00	97,357.27	150,137.27
St. Marys.....	4,479.20	7,148.03	11,627.23	6,505.52	777.55	4,479.20	14,431.10	18,910.30
Somerset.....	5,464.60	7,147.81	12,612.41	-----	7,386.78	5,464.60	14,534.59	19,999.19
Talbot.....	46,401.00	69,193.63	115,594.63	-----	12,572.03	46,401.00	81,765.66	128,166.66
Washington.....	28,725.20	43,584.25	72,309.46	-----	20,900.82	28,725.20	64,485.08	93,210.28
Wicomico.....	1,882.40	2,641.90	4,524.30	-----	7,565.84	1,882.40	10,207.74	12,090.14
Worcester.....	6,601.40	9,432.27	16,033.67	-----	12,047.29	6,601.40	21,479.56	28,080.96
Total.....	498,725.30	772,599.75	1,271,325.05	38,540.37	287,331.27	498,725.30	1,063,441.39	1,567,166.69

MASSACHUSETTS

County	Tobacco			Corn-hog, 1934	All commodities		
	1933	1934	Total		1933	1934	Total
Berkshire.....	-----	-----	-----	\$3,050.80	-----	\$3,050.80	\$3,050.80
Bristol.....	-----	-----	-----	2,971.95	-----	2,971.95	2,971.95
Essex.....	-----	-----	-----	9,475.09	-----	9,475.09	9,475.09
Franklin.....	-----	-----	-----	2,308.18	-----	102,829.81	142,225.91
Hampden.....	-----	-----	-----	1,511.50	-----	49,771.54	64,023.74
Hampshire.....	-----	-----	-----	2,875.10	-----	136,099.43	160,764.23
Middlesex.....	-----	-----	-----	138,599.20	-----	138,599.20	138,599.20
Norfolk.....	-----	-----	-----	6,885.00	-----	6,885.00	6,885.00
Plymouth.....	-----	-----	-----	2,366.00	-----	2,366.00	2,366.00
Suffolk.....	-----	-----	-----	7,373.20	-----	7,373.20	7,373.20
Worcester.....	-----	-----	-----	10,081.85	-----	10,081.85	10,081.85
Total.....	78,313.10	282,006.00	360,319.10	187,507.87	78,313.10	469,513.87	547,826.97

Rental and benefit payments through Dec. 31, 1934—by States and counties—Continued

MICHIGAN

County	Wheat			Corn-hog 1934	All commodities		
	1934		Total		1933	1934	Total
	1933						
Alcona.....				\$1,507.00		\$1,507.00	\$1,507.00
Allegan.....				36,526.86		62,557.50	62,557.50
Alpena.....	\$165.60	\$26,030.64	\$26,233.17		\$165.60	62,557.50	62,557.50
Antrim.....	124.40	67.57		682.80		682.80	682.80
Arenac.....		671.53	795.93	3,584.80	124.40	4,256.33	4,380.73
Barry.....		41,289.93	41,289.93	38,673.97		79,963.90	79,963.90
Bay.....		8,964.71	8,964.71	9,883.39		18,848.30	18,848.30
Benzie.....	39.00	46.42	85.42	1,141.45	39.00	1,187.87	1,226.87
Berrien.....	10,809.00	1,217.16	12,026.16	28,914.45	10,809.00	30,131.61	40,940.61
Branch.....	6,183.80	7,862.14	14,045.94	96,625.97	6,183.80	104,488.11	110,671.91
Calhoun.....	14,119.80	22,265.87	36,385.67	66,289.28	14,119.80	88,555.15	102,674.95
Cass.....		25,312.75	25,312.75	59,442.02		84,754.77	84,754.77
Charlevoix.....	192.60	200.26	392.86	2,546.23	192.60	2,746.49	2,939.09
Cheboygan.....		248.65	248.65	1,868.70		2,117.35	2,117.35
Chippewa.....				3,020.90		3,349.10	3,349.10
Clare.....		328.20	328.20	50,179.60		90,886.52	122,282.52
Clinton.....	31,406.00	40,706.92	72,112.92	322.00	31,406.00	322.00	322.00
Delta.....				110.00		110.00	110.00
Dickinson.....	46,191.40	65,027.46	111,218.86	42,944.06	46,191.40	107,971.52	154,162.92
Eaton.....				1,379.65		1,379.65	1,379.65
Emmet.....		30,574.17	50,020.97	25,087.92		55,662.09	75,108.89
Genesee.....	19,446.80	164.30	5,926.65	5,926.65	19,446.80	6,090.95	6,090.95
Gladwin.....		357.24	471.64	3,913.91		4,271.15	4,385.55
Grand Traverse.....	114.40	27,891.59	27,891.59	63,432.32	114.40	91,323.91	91,323.91
Gratiot.....		9,164.35	17,110.35	94,239.24		103,403.59	111,349.59
Hillsdale.....	7,946.00			84.00	7,946.00	84.00	84.00
Houghton.....		36,719.84	67,253.04	30,616.15		67,335.99	97,869.19
Huron.....	30,533.20	15,236.56	26,344.56	32,463.67	30,533.20	47,700.23	58,808.23
Ingham.....	11,108.00	63,749.64	93,514.64	53,334.92	11,108.00	117,084.56	146,849.56
Ionia.....	29,765.00	5,044.70	5,161.90	2,232.80	29,765.00	7,277.50	7,394.70
Iosco.....	117.20	12,634.06	19,971.26	18,739.32	117.20	31,373.38	38,710.58
Isabella.....	7,337.20	14,848.00	41,451.91	41,451.91	7,337.20	56,299.91	61,686.64
Jackson.....	5,760.20	31,279.72	30,406.92	13,058.60	5,760.20	48,628.04	56,299.91
Kalamazoo.....	13,058.60	66,346.66	66,346.66	18,325.88	13,058.60	1,089.77	61,686.64
Kalkaska.....				18,482.82		84,672.54	84,672.54
Kent.....				18,482.82		26,500.40	32,890.00
Lake.....				1,775.57		1,990.92	1,990.92
Lapeer.....	6,389.60	8,060.80	14,450.40	18,439.60	6,389.60	26,500.40	32,890.00
Leelanau.....		215.35	215.35	1,775.57		1,990.92	1,990.92

Lenawee.....	17, 734.80	28, 754.13	46, 488.93	166, 686.21	17, 734.80	195, 440.34	213, 175.14
Livingston.....	5, 921.80	6, 895.23	12, 817.03	21, 468.20	5, 921.80	28, 363.43	34, 285.23
Macomb.....	-----	3, 368.47	3, 368.47	8, 913.07	-----	12, 251.54	12, 251.54
Manistee.....	-----	-----	-----	1, 506.91	-----	1, 506.91	1, 506.91
Mason.....	1, 480.20	1, 860.02	3, 340.22	4, 489.33	1, 480.20	6, 349.35	7, 829.55
Mecosta.....	-----	907.86	907.86	7, 716.97	-----	8, 624.83	8, 624.83
Menominee.....	-----	-----	-----	466.00	-----	466.00	466.00
Midland.....	236.80	1, 023.86	1, 023.86	6, 113.60	236.80	7, 137.46	7, 137.46
Missaukee.....	-----	577.87	814.67	3, 445.68	-----	4, 023.55	4, 260.35
Monroe.....	-----	49, 562.97	49, 562.97	86, 136.48	-----	135, 699.45	135, 699.45
Montcalm.....	9, 408.40	11, 074.60	20, 483.00	16, 105.14	9, 408.40	27, 179.74	36, 588.14
Montmorency.....	9, 345.60	240.82	586.42	799.85	9, 345.60	1, 040.67	1, 386.27
Muskegon.....	-----	6, 577.71	6, 577.71	3, 864.95	-----	10, 442.66	10, 442.66
Nevadgo.....	-----	4, 679.41	4, 679.41	5, 628.05	-----	10, 307.46	10, 307.46
Oakland.....	2, 584.60	2, 628.17	5, 212.77	8, 374.45	2, 584.60	11, 002.62	13, 587.22
Oceana.....	1, 369.80	1, 837.46	3, 507.26	5, 608.58	1, 369.80	7, 606.04	8, 975.84
Ogemaw.....	416.20	296.90	713.10	3, 109.65	416.20	3, 406.55	3, 822.75
Oscoda.....	-----	526.39	526.39	5, 165.05	-----	5, 691.44	5, 691.44
Otsego.....	101.40	147.32	248.72	88.00	101.40	88.00	88.00
Ottawa.....	16, 858.20	8, 115.35	24, 973.55	172.55	16, 858.20	319.87	421.27
Presque Isle.....	731.00	1, 315.67	2, 046.67	20, 034.05	731.00	28, 149.40	45, 007.60
Roscommon.....	-----	-----	-----	474.60	-----	1, 790.27	2, 521.27
Saginaw.....	16, 683.60	21, 009.41	37, 693.01	142.00	16, 683.60	142.00	142.00
St. Clair.....	-----	11, 595.36	11, 595.36	32, 202.51	-----	53, 211.92	69, 895.52
St. Joseph.....	6, 800.20	9, 691.78	16, 491.98	5, 384.45	6, 800.20	16, 979.81	16, 979.81
Sanilac.....	19, 213.40	21, 672.83	40, 886.23	55, 420.00	19, 213.40	65, 111.78	71, 911.98
Schoolcraft.....	-----	-----	-----	19, 972.61	-----	41, 645.44	60, 858.84
Shiawassee.....	25, 057.00	38, 409.33	63, 466.33	879.90	25, 057.00	879.90	879.90
Tuscola.....	-----	26, 639.51	26, 639.51	27, 017.30	-----	65, 426.63	90, 483.63
Van Buren.....	-----	7, 807.80	7, 807.80	26, 693.32	-----	53, 332.83	53, 332.83
Washtenaw.....	-----	25, 647.67	25, 647.67	30, 614.86	-----	38, 422.66	38, 422.66
Wayne.....	-----	2, 717.41	2, 717.41	50, 438.49	-----	76, 086.16	76, 086.16
Wexford.....	-----	-----	-----	6, 930.34	-----	9, 647.75	9, 647.75
Total.....	365, 750.80	839, 548.15	1, 205, 298.95	1, 523, 953.15	365, 750.80	2, 363, 501.30	2, 729, 252.10

Rental and benefit payments through Dec. 31, 1934—by States and counties—Continued

MINNESOTA

County	Wheat			Tobacco			Corn-bog, 1934	All commodities		
	1933	1934	Total	1933	1934	Total		1933	1934	Total
Aitkin							\$2,338.80	\$31.90	\$2,366.00	\$2,397.90
Anoka		\$164.13	\$164.13				25,223.70		25,387.83	25,387.83
Becker		22,110.04	22,110.04				17,073.25		39,183.29	39,183.29
Belt							2,745.74		2,745.74	2,745.74
Beltrami		429.49	429.49				30,918.84	651.90	34,003.63	34,655.53
Benton		53,782.91	88,030.91			3,307.20	109,160.15	34,248.00	122,943.06	197,191.06
Big Stone	\$34,248.00						346,030.20	21,105.80	372,928.06	394,033.86
Blue Earth	21,105.80	26,897.86	48,003.66				211,480.91	10,256.40	227,095.48	237,351.88
Brown	10,256.40	15,614.57	25,870.97				3,723.25		3,723.25	3,723.25
Carlton							69,026.14	3,814.80	69,398.74	73,213.54
Carver	3,814.80	372.60	4,187.40				5,434.70		5,434.70	5,434.70
Cass							211,838.72	27,787.60	259,455.34	287,242.94
Chippewa	27,787.60	47,616.62	75,404.22				14,004.98		13,896.19	13,896.19
Chisago		1,891.21	1,891.21				24,232.54		183,139.71	183,139.71
Clay		138,713.17	138,713.17		134.00	134.00	4,050.99	1,606.00	4,821.10	6,427.10
Clearwater	1,606.00	2,376.11	2,376.11				262,591.42	1,657.80	264,590.34	266,248.14
Cottonwood	1,657.80	1,998.92	3,656.72				4,827.62		4,827.62	4,827.62
Crow Wing							82,623.55	17,504.80	115,954.17	133,458.97
Dakota	17,504.80	33,330.62	50,835.42				97,539.77	1,251.00	99,327.41	100,578.41
Dodge		3,038.64	3,038.64				59,895.07	16,088.40	83,268.25	99,356.65
Douglas	16,088.40	23,373.18	39,461.58				389,004.46	4,065.40	399,068.05	403,133.45
Faribault	4,065.40	10,633.59	14,128.99				332,266.94	3,537.60	331,309.42	334,847.02
Fillmore	2,563.60	4,012.50	6,576.10				332,418.37	9,012.60	345,131.03	354,143.63
Freeborn	9,012.60	21,725.26	26,576.10		4,029.98	5,003.98	102,904.91		120,867.66	120,867.66
Goodhue		17,962.75	17,962.75				98,730.49		132,034.52	152,034.52
Grant		53,304.03	53,304.03				27,870.43	3,279.20	34,637.12	37,916.32
Hennepin	3,279.20	6,766.69	10,045.89				128,587.73	1,857.50	131,153.74	133,011.24
Houston	285.20	360.98	646.18	1,572.30	2,205.03	3,777.33	6,230.55		6,230.55	6,230.55
Hubbard							12,046.69		12,496.54	12,496.54
Isanti		449.85	449.85				3,453.70		3,453.70	3,453.70
Itasca							320,896.28	157.80	320,940.45	321,098.25
Jackson		43.65	201.45				7,318.60		7,388.73	7,388.73
Kanabec	157.80	70.13	201.45				270,673.99	15,879.80	297,364.36	313,244.16
Kandiyo	15,833.80	26,601.37	42,435.17		89.00	135.00	4,864.78		73,541.76	73,541.76
Kittson		68,676.98	68,676.98				207,834.38	43,924.00	298,624.19	342,548.19
Lac qui Parle	43,924.00	90,789.81	134,713.81				143,303.40		217,144.88	217,144.88
Le Sueur		73,808.96	73,808.96		32.52	32.52	155,297.71	4,252.40	161,259.08	165,512.08
Lincoln	4,252.40	5,961.97	10,214.37				242,961.86		248,106.27	260,756.87
Lyon	12,650.60	5,144.41	17,795.01				163,338.87	12,650.60	178,337.84	178,337.84
McLeod		14,998.97	14,998.97							

Mahomen.....	13, 032.82	13, 032.82				7, 575.64	20, 608.46
Marshall.....	185, 158.60	185, 158.60				10, 460.96	195, 619.56
Martin.....						385, 870.94	386, 769.85
Meeker.....	21, 785.12	35, 790.72	1, 625.40	2, 613.36		333.00	174, 350.81
Miller Loes.....		119.53	299.00	965.80		15, 631.00	12, 004.43
Morrison.....	8, 948.88	15, 700.28				299.00	86, 026.23
Mower.....	3, 318.51	5, 570.31				70, 265.95	79, 214.83
Murray.....	3, 446.10	446.10				267, 523.93	270, 842.44
Nicollot.....	37, 444.76	56, 062.16				288, 823.12	289, 269.22
Nobles.....						237, 364.41	274, 809.17
Norman.....	97, 224.34	97, 224.34				298, 844.22	298, 844.22
Omsted.....	4, 206.96	6, 564.56				27, 608.15	124, 832.49
Otter Trail.....	45, 719.61	77, 182.41				166, 864.63	171, 071.59
Pennington.....	14, 377.22	14, 377.22				152, 788.59	198, 468.20
Pine.....	73.03	73.03				5, 184.36	229, 921.00
Pistone.....	563.91					11, 590.20	19, 561.58
Polk.....	279, 469.78	279, 469.78				144, 207.13	11, 663.23
Pope.....	39, 051.12	39, 051.12	40.00	73.40	113.40	37, 563.37	144, 771.04
Ramsey.....	1, 026.97	1, 376.97				73, 883.21	317, 033.15
Red Lake.....	12, 920.36	21, 071.96				4, 987.40	112, 957.73
Redwood.....	45, 343.70	45, 343.70				350.00	6, 014.37
Renville.....	45, 056.43	70, 585.83				8, 151.60	20, 741.68
Rice.....	18, 248.83	29, 866.63				317, 027.62	362, 371.32
Rock.....						436, 569.36	481, 625.79
Roseau.....	7, 496.82	7, 496.82				129, 189.67	507, 155.19
St. Louis.....						204, 496.21	159, 056.30
Scott.....	30, 750.14	49, 480.94				10, 268.37	204, 496.21
Sherburne.....	3, 776.97	3, 776.97	352.00	286.40	286.40	2, 771.55	10, 268.37
Sibley.....	15, 500.49	26, 060.49		1, 522.10	1, 574.10	1, 488.20	1, 488.20
Searns.....	42, 336.08	73, 355.48				86, 943.57	117, 980.11
Steele.....	9, 667.35	9, 667.35	6, 156.01	23, 541.64	29, 097.65	37, 320.44	42, 619.51
Stevens.....	50, 256.21	50, 256.21				157, 806.30	173, 306.79
Swift.....	31, 959.21	50, 194.01				215, 836.06	281, 713.78
Todd.....	3, 419.52	5, 518.12				152, 437.88	162, 105.23
Traverse.....	81, 123.57	134, 418.37				164, 273.76	214, 529.97
Wabasha.....	9, 49.79	14, 466.90				158, 745.37	214, 529.97
Wadena.....	585.03	1, 003.65				18, 234.80	208, 939.38
Waseca.....	19, 077.05	19, 077.05				66, 372.41	69, 791.93
Washington.....	8, 401.53	14, 150.93				138, 755.25	138, 755.25
Watonwan.....	1, 452.55	3, 287.35				53, 294.80	219, 878.82
Wilkin.....	168, 069.16	168, 069.16				5, 047.20	171, 662.52
Winona.....	6, 873.53	11, 606.53				28, 111.47	28, 552.07
Wright.....	17, 652.81	30, 611.61	36.00	38.90	74.90	208, 313.69	208, 313.69
Yellow Medicine.....	89, 222.40	89, 222.40	52.00	110.00	162.00	5, 749.40	36, 982.45
						1, 804.80	189, 200.46
						63, 927.89	231, 997.05
						4, 769.00	132, 620.57
						131, 169.65	137, 389.57
						13, 010.80	151, 943.26
						318, 138.99	318, 138.99
Total.....	2, 251, 676.39	2, 769, 522.19	11, 836.51	38, 324.63	50, 161.14	529, 682.31	13, 099, 480.93

Leake.....	82, 040.94	114, 266.58	196, 307.52	81.50	82, 010.94	114, 348.08	196, 389.02
Lee.....	140, 144.72	182, 637.62	322, 732.34	325.80	140, 144.72	182, 963.42	323, 108.14
Leflore.....	338, 806.49	408, 151.88	766, 938.37	---	358, 806.49	408, 151.88	766, 938.37
Lincoln.....	110, 742.60	78, 398.56	189, 141.16	---	110, 742.60	78, 320.86	189, 262.96
Lowndes.....	84, 858.64	61, 611.21	146, 469.85	764.10	84, 858.64	62, 376.31	147, 263.95
Madison.....	222, 560.17	242, 482.92	465, 043.09	---	222, 560.17	242, 482.92	465, 043.09
Marion.....	103, 100.99	104, 386.61	207, 487.60	---	103, 100.99	104, 386.61	207, 487.60
Marshall.....	137, 202.26	121, 254.31	238, 456.57	---	137, 202.26	121, 254.31	238, 456.57
Monroe.....	150, 689.06	167, 433.96	318, 123.02	6, 724.25	150, 689.06	174, 158.21	324, 847.27
Monroeville.....	49, 459.53	51, 445.76	100, 905.29	86.75	49, 459.53	51, 532.61	100, 992.04
Neshoba.....	137, 595.02	129, 846.79	287, 441.81	1, 610.40	137, 595.02	131, 457.19	269, 052.21
Newton.....	143, 176.08	114, 205.74	257, 381.82	---	143, 176.08	114, 205.74	257, 381.82
Noxubee.....	87, 829.52	85, 199.26	173, 028.78	---	87, 829.52	85, 199.26	173, 028.78
Oktibbeha.....	36, 803.46	33, 723.03	70, 526.49	---	36, 803.46	33, 723.03	70, 526.49
Panola.....	154, 476.49	162, 259.40	316, 735.89	---	154, 476.49	162, 259.40	316, 735.89
Pearl River.....	4, 153.25	4, 612.11	8, 765.36	---	4, 153.25	4, 612.11	8, 765.36
Perry.....	17, 386.00	12, 661.48	30, 047.48	---	17, 386.00	12, 661.48	30, 047.48
Pike.....	75, 394.26	70, 638.15	146, 042.41	---	75, 394.26	70, 638.15	146, 042.41
Pontotoc.....	106, 012.26	99, 724.11	205, 736.37	---	106, 012.26	99, 724.11	205, 736.37
Prentiss.....	90, 232.57	85, 856.18	176, 088.75	45.00	90, 232.57	85, 901.18	176, 133.75
Quitman.....	242, 013.80	236, 504.34	478, 522.84	---	242, 013.80	236, 504.34	478, 522.84
Raukin.....	56, 411.90	57, 630.39	114, 042.29	292.20	56, 411.90	57, 922.59	114, 334.49
Scott.....	94, 727.25	93, 076.17	187, 803.42	---	94, 727.25	93, 076.17	187, 803.42
Sharkey.....	175, 778.46	144, 251.75	320, 030.21	331.00	175, 778.46	144, 251.75	320, 361.21
Simpson.....	102, 308.95	106, 985.25	209, 304.20	113.70	102, 308.95	107, 108.95	209, 417.90
Smith.....	95, 280.72	91, 829.98	187, 110.70	---	95, 280.72	91, 829.98	187, 110.70
Stone.....	1, 579.00	2, 020.43	3, 599.43	---	1, 579.00	2, 020.43	3, 599.43
Sunflower.....	760, 297.75	735, 246.01	1, 485, 543.76	---	760, 297.75	735, 246.01	1, 485, 543.76
Tallahatchie.....	245, 958.38	288, 396.19	534, 354.55	---	245, 958.38	288, 396.19	534, 354.55
Tate.....	104, 298.87	124, 481.01	226, 779.88	---	104, 298.87	122, 481.01	226, 779.88
Tippah.....	112, 804.65	124, 504.17	237, 308.82	47.20	112, 804.65	124, 551.37	237, 356.02
Tishomingo.....	98, 424.98	76, 616.41	135, 041.39	793.75	98, 424.98	77, 410.16	135, 835.14
Tunica.....	263, 673.06	241, 454.26	505, 127.32	---	263, 673.06	241, 454.26	505, 127.32
Union.....	105, 375.11	93, 089.60	198, 464.71	---	105, 375.11	93, 089.60	198, 464.71
Walthall.....	143, 513.00	86, 304.32	229, 817.32	---	143, 513.00	86, 304.32	229, 817.32
Warren.....	28, 626.50	46, 127.92	74, 754.42	284.75	28, 626.50	46, 412.67	75, 039.17
Washington.....	476, 719.50	408, 430.55	945, 150.05	---	476, 719.50	468, 430.55	945, 150.05
Wayne.....	62, 874.88	37, 205.39	90, 080.27	---	62, 874.88	37, 205.39	90, 080.27
Webster.....	62, 705.59	44, 890.27	107, 595.86	---	62, 705.59	44, 890.27	107, 595.86
Wilkinson.....	41, 439.06	27, 875.37	69, 314.43	---	41, 439.06	27, 875.37	69, 314.43
Winston.....	82, 327.75	90, 962.01	173, 238.76	3, 568.70	82, 327.75	94, 530.71	176, 858.46
Yalobusha.....	51, 516.81	46, 871.41	98, 388.22	902.65	51, 516.81	47, 774.06	99, 290.87
Yazoo.....	276, 014.12	279, 219.79	555, 233.91	836.90	276, 014.12	280, 056.69	556, 070.81
Total.....	9, 924, 837.57	9, 813, 914.30	19, 738, 751.87	30, 914.60	9, 924, 837.57	9, 844, 828.90	19, 769, 666.47

Rental and benefit payments through Dec. 31, 1934—by States and countries—Continued

MISSOURI

County	Cotton		Tobacco, 1934	Wheat		Corn-hog, 1934	All commodities		
	1933	1934		1933	1934		1933	1934	Total
Adair.....				\$242.00	\$517.88	\$108,854.88	\$242.00	\$109,372.76	\$109,614.76
Andrew.....			\$501.20	11,408.12	11,408.12	378,087.36		389,996.68	389,996.68
Atchison.....			499.25	8,376.84	12,615.24	344,436.26	4,238.40	353,312.35	357,550.75
Audrain.....				1,355.80	2,610.60	180,753.10	1,254.80	182,108.90	183,363.70
Barry.....				9,476.20	16,402.49	65,427.71	9,476.20	81,830.20	91,306.40
Barton.....				27,770.80	42,937.59	122,759.73	27,770.80	165,697.32	193,468.12
Bates.....			1,186.00	23,405.14	32,193.94	260,101.42	8,788.80	284,692.56	293,481.36
Benton.....				2,372.80	6,051.09	74,738.95	2,372.80	78,417.20	80,790.04
Bollinger.....				3,457.20	7,508.68	43,496.32	3,457.20	47,607.80	51,065.00
Boone.....			342.00	4,111.48	15,719.54	148,720.90	5,875.04	185,907.40	198,782.44
Buchanan.....			9,121.70	30,095.26	52,127.46	147,180.48	22,032.20	186,397.44	205,429.64
Butler.....				789.20	2,271.10	51,792.75	52,535.57	88,877.46	141,413.33
Caldwell.....	\$51,746.67	\$35,602.81		914.35	2,271.10	153,568.02		155,809.20	155,809.20
Callaway.....			1,326.83	30,163.61	30,163.61	160,207.03		190,370.64	190,370.64
Camden.....				398.26	398.26	26,443.72	171.60	26,841.98	27,013.58
Cape Girardeau.....		63.00		7,069.20	10,933.43	75,582.37	7,069.20	86,578.80	93,648.00
Carroll.....		63.00	390.00	40,683.40	72,441.35	205,632.20	40,683.40	278,363.55	319,046.95
Carver.....						15,562.33		15,562.33	15,562.33
Cass.....				7,855.80	12,165.55	309,711.75	7,855.80	321,877.30	329,733.10
Cedar.....				4,106.00	6,145.74	101,633.69	4,106.00	107,779.43	111,886.43
Charlton.....			1,296.85	30,459.40	53,396.55	196,793.71	30,459.40	251,487.11	281,946.51
Christian.....				3,307.80	5,293.51	54,069.06	3,307.80	59,362.57	62,670.37
Clark.....					10,526.74	100,300.47		110,827.21	110,827.21
Clay.....			4,757.34	4,902.40	9,119.29	196,174.27	4,902.40	210,030.90	214,933.30
Clinton.....			2,008.97	832.40	3,241.49	197,916.24	832.40	202,334.30	203,166.70
Cole.....				13,582.20	34,782.04	52,972.25	13,582.20	74,172.09	87,754.29
Cooper.....				18,481.20	36,158.96	175,423.24	18,481.20	193,293.00	211,774.20
Crawford.....			192.00	17,677.76	36,158.96	33,447.78	752.00	34,349.81	35,101.81
Dade.....				13,782.65	38,348.63	75,728.92	13,782.65	100,294.90	114,077.55
Dallas.....				1,082.80	3,617.34	70,930.18	1,082.80	72,864.72	74,547.52
Davies.....				2,531.00	5,889.93	182,817.00	2,531.00	186,175.93	188,706.93
DeKalb.....				1,804.60	3,431.65	161,652.10	1,804.60	163,329.15	165,133.75
Dent.....				571.00	1,317.40	37,871.44	571.00	38,617.84	39,188.84
Douglas.....				287.20	33,332.44	287.20	287.20	33,332.44	33,619.64
Dunklin.....				1,832.49	3,749.89	27,627.61	447,692.97	401,804.51	849,497.48
Franklin.....	445,775.57	372,344.41	818,119.98	18,994.60	49,732.87	72,565.14	18,994.60	102,303.01	122,297.61
Gasconade.....				3,863.60	5,046.88	44,672.58	3,863.60	49,719.46	53,583.06
Gentry.....				1,553.00	1,022.46	196,254.56	1,553.00	197,277.02	198,830.02

Greene.....	16,356.01	10,610.60	26,966.61	196,813.90	10,610.60	213,169.91	223,780.51
Grundy.....	454.00	672.60	1,124.87	132,092.89	672.60	133,671.76	134,344.36
Harrison.....		572.60	1,553.23	213,055.61	572.60	214,036.24	214,808.84
Henry.....		3,262.40	5,115.62	214,019.01	3,262.40	219,134.63	222,397.03
Hickory.....		1,954.80	5,065.83	31,723.87	1,954.80	34,854.90	36,809.70
Holt.....		477.25	22,465.23	247,649.97	9,217.00	261,375.45	270,592.45
Howard.....		934.00	44,312.90	207,898.01		247,144.91	270,144.91
Howell.....	1,785.75		1,292.84	64,306.16	1,785.75	66,362.47	68,148.22
Iron.....		720.80	2,000.42	7,139.73	720.80	8,413.35	9,140.15
Jackson.....		8,701.20	27,130.37	139,064.23	8,701.20	158,143.46	163,844.66
Jasper.....	50.00	48,709.32	113,386.52	94,646.36	48,709.32	139,323.56	208,032.88
Jefferson.....		7,699.60	20,509.29	31,981.94	7,699.60	44,791.63	52,491.23
Johnson.....		7,913.40	23,588.76	254,979.06	7,913.40	270,654.42	278,567.82
Knox.....	40.00	986.82	986.82	178,611.04		179,637.86	179,637.86
Laclede.....		2,070.20	5,340.65	84,414.03	2,070.20	87,684.48	89,754.68
Lafayette.....	114.00	36,521.10	102,300.96	369,355.11	36,521.10	435,248.97	471,770.07
Lawrence.....		20,757.40	67,513.62	82,840.80	20,757.40	129,597.02	150,354.42
Lewis.....		10,169.40	11,576.32	10,169.40	10,169.40	183,683.85	193,853.25
Lincoln.....		17,013.60	34,266.37	118,325.35	17,015.60	152,591.72	169,607.32
Linn.....	64.00	768.45	51,281.97	144,421.03	345.30	145,254.48	145,599.68
Livingston.....		3,405.40	1,114.65	211,736.11	3,405.40	214,165.47	217,570.87
McDonald.....	52.00	979.12	2,765.65	28,908.95		30,767.48	31,746.60
Macon.....	106.00		7,248.25	140,885.35		148,239.60	148,239.60
Madison.....		1,374.60	2,296.40	13,367.63	1,374.60	14,545.47	15,920.07
Marion.....		2,996.40	3,324.90	5,621.30	2,996.40	54,726.38	57,022.78
Marles.....		18,480.20	40,169.33	58,649.53	18,480.20	137,586.51	176,066.71
Mercer.....		281.00	314.48	91,473.55	281.00	91,788.03	92,069.03
Miller.....	46.00		7,607.11	45,359.37	3,535.40	49,477.08	53,012.48
Mississippi.....		10,712.00	31,000.20	64,293.29	114,070.50	148,313.22	262,383.72
Moniteau.....	84.00	8,713.40	21,858.88	87,602.46	8,715.40	109,545.34	109,545.34
Monroe.....		1,418.60	1,837.19	197,278.99	1,418.60	197,797.58	199,216.18
Montgomery.....		3,639.80	10,689.28	140,100.59	5,659.80	150,759.87	156,449.67
Morgan.....		2,991.40	8,976.73	69,950.57	2,991.40	75,935.90	78,927.30
New Madrid.....		11,231.66	23,284.69	72,701.75	407,314.50	239,193.03	666,507.53
Newton.....		8,227.80	28,985.51	67,744.54	11,231.66	85,498.39	96,730.05
Nodaway.....		332.20	21,288.85	684,163.98	8,227.80	697,195.03	705,422.83
Oregon.....		355.20	687.40	67,551.87	8,924.20	60,514.71	69,438.91
Osage.....		10,544.40	27,016.70	67,551.87	10,544.40	84,024.17	94,568.57
Ozark.....	3,549.72		5,150.97	37,895.05	3,784.32	39,496.30	43,280.62
Pemiscot.....	573,761.50		1,083,263.75	4,291.75	575,761.50	481,794.00	557,555.50
Perry.....		6,880.80	18,730.22	50,235.57	6,880.80	109,571.74	109,571.74
Pettis.....		1,576.00	2,893.61	251,629.46		263,478.88	270,359.68
Phelps.....		11,617.60	33,992.42	25,085.05	1,576.00	26,404.66	27,980.66
Pike.....		28,220.05	67,863.90	162,333.51	11,617.60	184,708.33	196,325.93
Platte.....	30,343.69		13,031.17	165,008.87	28,220.05	234,996.41	263,216.46
Polk.....		312.55	524.95	77,199.06	5,753.20	84,477.03	90,230.23
Pulaski.....		246.20	324.76	46,619.76	212.40	46,932.31	47,144.71
Purnam.....	52.00		17,427.28	69,360.14	246.20	69,490.70	69,736.90
Ralls.....		5,200.00	5,738.93	193,101.77	5,200.00	205,329.05	210,529.05
Randolph.....		4,001.93	46,913.40	98,587.63	1,737.00	102,589.56	104,326.56
Ray.....	507.34			212,014.85		259,435.59	259,435.59
Reynolds.....				39,296.50		39,296.50	39,296.50
Ripley.....	7,465.50		5,452.44	36,706.74	7,465.50	42,159.18	49,624.68

Rental and benefit payments through Dec. 31, 1934—by States and counties—Continued
MISSOURI—Continued

County	Cotton		Tobacco, 1934	Wheat		Corn-hog, 1934	All commodities		
	1933	1934		1933	1934		1933	1934	Total
St. Charles					\$149,268.31	\$78,021.97		\$227,890.28	\$227,890.28
St. Clair					4,017.91	102,065.76	\$2,870.40	106,083.67	108,954.07
St. Francois					2,948.34	5,815.14	2,866.80	26,879.95	29,746.75
St. Louis					25,259.78	39,064.18	14,404.40	59,996.50	74,400.90
St. Genevieve					9,734.60	15,882.60	6,148.00	37,421.05	43,569.05
Saline					44,723.66	68,774.06	24,050.40	343,488.55	367,538.95
Schuyler			\$294.00	232.40	264.91	298,764.89	292.40	35,777.82	36,010.22
Scotland			84.00	179.60	234.94	35,248.91	179.60	110,894.19	111,073.79
Scott	\$94,171.75	\$39,141.56		24,276.40	30,011.87	110,573.25	118,448.15	135,511.01	273,969.16
Shannon				103.20	111.93	77,357.98	103.20	44,600.17	44,703.37
Shelby				1,314.40	2,418.65	193,909.61	1,314.40	196,328.26	197,642.66
Stoddard				10,753.40	20,051.76	118,623.86	147,446.62	190,513.54	337,960.16
Stone			376.00	360.60	448.98	809.58	300.60	30,383.91	30,744.51
Sullivan			52.00	108.80	192.88	105,754.12	108.80	105,999.00	106,107.80
Taney	1,022.00	126.93			223.17	16,305.33	1,022.00	16,693.43	17,715.43
Texas			38.00		2,548.50	80,601.26	1,608.00	83,149.76	84,757.76
Vernon					32,008.12	153,675.69		185,683.71	185,683.71
Warren				14,407.00	32,008.12	32,008.12	14,407.00	62,471.15	76,878.15
Washington				2,608.00	3,208.28	5,816.28	2,608.00	37,218.45	39,826.45
Wayne				666.80	913.67	1,580.47	666.80	41,673.61	42,340.41
Webster				691.00	699.00	1,390.00	691.00	53,283.70	53,974.70
Worth				809.80	1,097.29	124,845.49	809.80	125,942.78	126,752.58
Wright				316.00	406.66	30,356.61	316.00	30,703.27	31,019.27
Total	1,837,213.68	1,213,963.59	55,740.42	713,009.54	1,588,406.38	13,399,772.85	2,550,283.22	16,257,948.24	18,808,231.46

MONTANA

County	Wheat, 1934	Corn-hog, 1934	Total, 1934	County	Wheat, 1934	Corn-hog, 1934	Total, 1934
Beaverhead.....	\$5,083.69	\$5,312.00	\$10,395.69	Meagher.....	\$7,111.20		\$7,111.20
Big Horn.....	123,421.35	12,090.50	135,511.85	Mineral.....	1,734.88		1,734.88
Blaine.....	204,675.58	3,604.30	208,279.88	Missoula.....	30,597.53	\$5,967.86	36,405.39
Broadwater.....	26,766.63	3,609.39	30,376.02	Musselshell.....	47,641.22	1,827.03	49,468.25
Carbon.....	110,571.96	14,089.60	124,661.56	Park.....	51,529.63	5,823.66	57,353.29
Carter.....	29,124.78	8,471.10	37,595.88	Petroleum.....	25,439.32	2,445.47	27,884.79
Cascade.....	375,836.28	7,395.00	383,231.28	Phillips.....	221,134.58	2,413.85	223,548.43
Chouteau.....	862,360.80	11,408.53	873,769.33	Pondera.....	420,724.69	8,028.44	428,753.13
Custer.....	37,978.42	1,483.60	39,462.02	Powder River.....	16,719.79	4,403.65	21,123.44
Daniels.....	362,053.13	3,690.77	365,743.90	Powell.....	6,122.00	695.04	6,817.04
Dawson.....	252,121.92	3,078.40	255,200.32	Prairie.....	130,674.80	973.55	131,648.35
Deer Lodge.....	1,905.82	1,153.03	3,058.85	Ravalli.....	17,860.11	16,335.87	34,195.98
Fallon.....	172,860.25	9,619.56	182,479.81	Richland.....	290,179.41	5,055.23	295,234.64
Fergus.....	624,641.61	10,356.31	634,997.92	Roosevelt.....	573,721.72	3,236.36	576,958.08
Flathead.....	78,924.23	6,634.71	85,558.94	Rosebud.....	64,242.93	1,671.40	65,914.33
Gallatin.....	138,281.38	13,813.62	152,095.00	Sanders.....	16,947.86	1,863.25	18,811.11
Glacier.....	46,267.62	1,096.40	47,324.02	Sheridan.....	542,340.73	8,726.67	551,067.40
Garfield.....	73,942.88	3,188.66	77,131.54	Silver Bow.....		692.88	692.88
Golden Valley.....	44,263.22	1,928.07	46,191.29	Stillwater.....	182,036.30	10,707.80	192,744.10
Granite.....	1,983.70	1,141.03	3,124.73	Sweet Grass.....	25,654.46	2,292.73	27,947.19
Hill.....	404,715.21	3,548.90	408,264.11	Teton.....	435,902.90	5,325.20	441,228.10
Jefferson.....	9,845.20	2,118.39	11,963.59	Toole.....	184,677.32	2,949.77	187,627.09
Judith Basin.....	248,251.44	5,397.52	253,648.96	Treasure.....	23,632.70	1,680.00	25,312.70
Lake.....	47,841.09	14,750.70	62,591.79	Valley.....	464,544.31	5,330.59	469,874.90
Lewis and Clark.....	23,289.03	3,100.59	26,389.62	Wheatland.....	30,483.28	1,552.34	32,035.62
Liberty.....	189,586.52		189,586.52	Wibaux.....	133,471.29	11,006.51	144,477.80
Lincoln.....	4,574.66	1,166.96	5,741.62	Yellowstone.....	213,586.81	7,107.38	220,696.19
McCone.....	242,695.57	2,927.84	245,623.41	Total.....	8,981,267.05	284,245.72	9,265,512.77
Madison.....	25,749.31	4,067.71	29,817.02				

NOTE.—No rental and benefit payments for 1933.

Rental and benefit payments through Dec. 31, 1934—by States and counties—Continued

NEBRASKA

County	Wheat		Corn-hog, 1934	All commodities		
	1933	1934		1933	1934	Total
Adams		\$272, 253. 59	\$104, 960. 97		\$377, 214. 56	\$777, 214. 56
Antelope		2, 452. 17	253, 909. 06	\$1, 273. 00	236, 361. 83	237, 634. 83
Arthur	\$1, 273. 00		16, 097. 56		16, 097. 56	16, 097. 56
Banner		933. 20	33, 368. 71		226, 308. 41	226, 308. 41
Blaine	293. 60	192, 939. 70	13, 137. 23	293. 60	14, 070. 43	14, 364. 03
Boone	3, 276. 80	6, 174. 87	282, 932. 90	3, 276. 80	289, 107. 77	292, 384. 57
Box Butte	106, 101. 66	201, 194. 08	72, 583. 46	106, 101. 66	273, 777. 54	379, 879. 20
Boyd		8, 699. 16	95, 560. 25		104, 259. 41	104, 259. 41
Brown	732. 20	1, 131. 40	48, 329. 32	732. 20	49, 460. 78	50, 192. 98
Buffalo	41, 853. 19	77, 053. 64	118, 906. 83	41, 853. 19	321, 959. 36	363, 812. 55
Burt	6, 901. 40	11, 567. 04	354, 767. 78	6, 901. 40	366, 334. 82	373, 236. 22
Butler		124, 405. 83	275, 008. 50		399, 414. 33	399, 414. 33
Cass	20, 849. 40	37, 088. 65	58, 538. 05	20, 849. 40	325, 321. 66	346, 171. 06
Cedar	1, 618. 20	3, 081. 21	4, 699. 41	1, 618. 20	333, 531. 09	335, 149. 29
Chase		175, 645. 02	205, 077. 24		380, 722. 26	380, 722. 26
Cherry	1, 804. 80	2, 645. 09	4, 449. 89	1, 804. 80	101, 704. 75	103, 509. 55
Cheyenne		726, 422. 40	107, 012. 34		833, 434. 74	833, 434. 74
Clay		301, 922. 08	85, 195. 81		387, 117. 89	387, 117. 89
Colfax	14, 468. 60	29, 415. 03	43, 883. 63	14, 468. 60	236, 434. 98	250, 903. 58
Cuming	253. 20	1, 795. 27	2, 048. 47	253. 20	601, 131. 91	601, 385. 11
Custer		45, 597. 24	599, 336. 04		558, 269. 78	558, 269. 78
Dakota	1, 342. 40	4, 183. 28	5, 525. 68	1, 342. 40	145, 704. 41	147, 046. 81
Dawson		106, 037. 23	106, 037. 23		159, 511. 46	159, 511. 46
Dawson		54, 643. 24	54, 643. 24		318, 158. 34	318, 158. 34
Deuel		304, 447. 25	304, 447. 25		363, 116. 64	363, 116. 64
Dixon		894. 08	219, 435. 34		230, 329. 42	230, 329. 42
Dodge	31, 302. 60	58, 876. 43	90, 179. 03	31, 302. 60	340, 773. 16	372, 075. 76
Douglas	4, 258. 80	10, 969. 70	13, 228. 56	4, 258. 80	129, 778. 09	134, 036. 89
Dundy		68, 871. 60	118, 808. 33		233, 336. 58	233, 336. 58
Fillmore	103, 206. 40	70, 393. 24	138, 810. 00	103, 206. 40	335, 694. 61	438, 901. 01
Franklin		176, 884. 61	290, 151. 01		186, 846. 57	186, 846. 57
Frontier		63, 656. 59	116, 553. 33		201, 721. 54	201, 721. 54
Furnas		75, 000. 51	209, 507. 37		284, 507. 88	284, 507. 88
Gage	76, 219. 40	185, 630. 13	261, 849. 53	76, 219. 40	448, 197. 79	524, 417. 19
Garden		140, 627. 94	75, 572. 42		216, 200. 36	216, 200. 36
Garfield	168. 80	450. 90	33, 334. 56	168. 80	33, 785. 46	33, 954. 26
Gosper		22, 498. 37	79, 743. 66		102, 241. 93	102, 241. 93
Grant			2, 708. 04		2, 708. 04	2, 708. 04

Greeley	1,648.60	4,942.81	6,591.41	142,630.37	1,643.60	147,573.18	149,221.78
Hall	38,131.40	67,741.21	105,872.61	120,544.05	38,131.40	188,285.26	226,416.66
Hamilton		198,510.39	198,510.39	262,062.36		460,572.75	460,572.75
Hartan		89,926.98	89,926.98	101,015.26		190,942.24	190,942.24
Hayes		108,699.87	108,699.87	106,472.10		215,171.97	215,171.97
Hitchcock		191,288.06	191,288.06	98,251.82		289,539.88	289,539.88
Holt		4,784.78	4,784.78	170,641.19		175,425.97	175,425.97
Hooker				7,269.79		7,269.79	7,269.79
Howard		73,567.94	73,567.94	174,704.10		248,272.84	248,272.84
Jefferson		127,690.32	203,595.52	158,353.04	75,905.20	286,043.36	361,948.56
Johnson		29,941.37	47,297.17	108,414.97	17,355.80	138,356.34	155,712.14
Kearney		266,927.40	266,927.40	105,143.12		372,070.52	372,070.52
Keith		224,572.35	224,572.35	149,770.42		374,342.77	374,342.77
Keyapaha		408,855.43	1,471.23	43,637.62	615.80	44,493.05	45,108.85
Kimball		408,156.87	408,156.87	26,275.15		434,432.02	434,432.02
Knox		1,971.73	3,380.13	285,098.72	1,408.40	287,040.45	288,448.85
Lancaster		119,876.51	181,097.58	297,113.32	61,221.07	416,989.83	478,210.90
Lincoln		151,615.70	151,615.70	175,337.64		326,953.34	326,953.34
Logan		2,005.65	2,005.65	33,150.07		35,155.72	35,155.72
Loup		1,330.28	1,330.28	24,003.37		25,333.65	25,333.65
McPherson		3,327.64	5,267.64	20,667.62		20,667.62	20,667.62
Madison		59,947.80	94,301.89	338,461.14	1,940.00	341,788.78	343,728.78
Merrick		117,442.91	117,442.91	136,067.26	34,354.00	196,015.15	230,369.15
Morrill		33,828.95	50,713.15	72,416.08		189,858.99	189,858.99
Nance		49,643.76	79,200.96	182,285.94	16,884.20	216,114.89	232,909.09
Nemaha		153,229.77	153,229.77	195,556.47	20,555.20	245,202.23	274,737.43
Nuckolls		37,421.25	65,030.73	147,132.07		300,361.84	300,361.84
Otoe		20,633.82	29,475.02	208,211.40	27,009.48	245,632.65	273,242.13
Pawnee		484,407.15	484,407.15	156,704.00	8,841.20	175,007.64	183,848.84
Perkins		192,620.59	192,620.59	128,103.29		320,723.88	320,723.88
Pheps		1,327.51	2,102.11	203,897.82	774.60	205,225.33	205,999.93
Pierce		32,422.20	48,835.80	322,377.71	16,413.60	354,799.91	371,213.51
Platte		102,662.53	102,662.53	189,404.62		292,067.15	292,067.15
Polk		127,275.95	127,275.95	113,923.26		240,499.21	240,499.21
Redwillow		49,138.77	74,313.17	412,988.21	25,176.40	462,126.98	487,303.38
Richardson		302,72.72	456.92	24,237.77	154.20	24,540.49	24,694.09
Rock		317,770.86	317,770.86	166,560.47		484,331.33	484,331.33
Saline		14,600.21	14,600.21	107,412.14		122,012.35	122,012.35
Sarpy		87,755.46	139,383.66	274,039.03	51,628.20	361,794.49	413,422.69
Saunders		55,680.78	55,680.78	36,231.63		91,912.31	91,912.31
Scotts Bluff		105,461.83	163,555.63	171,874.77	58,063.80	277,336.60	335,430.40
Seward		141,109.97	141,109.97	110,879.02		251,988.99	251,988.99
Sheridan		42,687.12	42,687.12	152,990.11		195,677.23	195,677.23
Sherman		41,323.00	41,323.00	20,149.34		61,472.34	61,472.34
Sioux		1,025.95	1,910.15	212,714.25	884.20	213,740.20	214,624.40
Stanton		1,025.95	1,910.15	146,530.64	75,019.40	273,021.76	348,041.16
Thayer		126,491.12	201,510.52	7,662.64		7,662.64	7,662.64
Thomas		1,384.27	2,318.27	311,688.80	934.00	313,073.07	314,067.07
Thurston		4,622.00	7,552.00	230,216.95	2,930.00	237,668.95	237,668.95
Valley		28,936.34	44,795.34	330,322.94	15,859.00	375,118.28	375,118.28
Washington		340.42	445.42	380,046.32	105.00	380,386.74	380,491.74
Wayne							

Rental and benefit payments through Dec. 31, 1934—by States and counties—Continued

NEBRASKA—Continued

County	Wheat		Corn-hog, 1934	All commodities		
	1933	1934		1933	1934	Total
Webster	\$32,437.37	\$59,614.77	\$134,405.65	\$32,437.37	\$194,020.43	\$226,457.80
Wheeler	52.60	797.84	35,104.57	52.60	35,902.81	35,955.41
York		111,856.10	215,504.50		327,360.60	327,360.60
Total	1,011,917.17	8,243,580.99	15,243,568.09	1,011,917.17	23,497,149.08	24,509,066.25

NEVADA

County	Wheat		Corn-hog, 1934	All commodities		
	1933	1934		1933	1934	Total
Churchill	\$4,679.40	\$5,726.99	\$2,138.10	\$4,679.40	\$7,915.09	\$12,594.49
Clark	1,969.20	3,628.02	1,057.10	1,969.20	1,057.10	1,057.10
Douglas	2,181.20	2,726.17	4,960.40	2,181.20	8,588.42	10,557.62
Elko	58.80	158.19	2,351.19	58.80	5,077.36	7,258.56
Eureka		1,458.50		874.40	158.19	216.99
Humboldt			23.50		1,453.50	2,332.90
Lander			1,746.15		23.50	23.50
Lincoln	3,297.40	5,220.45	9,661.40	3,297.40	14,881.85	18,179.25
Lyon	67.40	153.20	708.55	67.40	1,746.15	1,746.15
Nye	110.80	185.20		110.80	866.75	934.15
Ormsby	265.00	3,539.65	269.00	265.00	188.20	299.00
Pershing	2,070.20	3,085.67	1,128.00	2,070.20	4,667.65	4,932.65
Washoe	415.00	1,024.33	1,921.50	415.00	5,007.17	7,077.37
White Pine			1,341.75		2,366.08	2,781.08
Total	15,988.80	26,884.37	27,087.64	15,988.80	53,972.01	69,960.81

NEW HAMPSHIRE

County	Tobacco			Corn-hog, 1934	All commodities		
	1933	1934	Total		1933	1934	Total
Belnap.....				\$1,012.00		\$1,012.00	\$1,012.00
Carroll.....				558.15		558.15	558.15
Cheshire.....				939.15	\$1,754.20	6,921.15	8,675.35
Coos.....	\$1,754.20	\$5,982.00	\$7,736.20	1,174.00		1,174.00	1,174.00
Grafton.....				1,937.45		1,937.45	1,937.45
Hillsborough.....				2,854.25		2,854.25	2,854.25
Merrimack.....				4,021.90		4,021.90	4,021.90
Rockingham.....				2,474.40		2,474.40	2,474.40
Stratford.....				968.00		968.00	968.00
Sullivan.....				1,702.00		1,702.00	1,702.00
Total.....	1,754.20	5,982.00	7,736.20	17,641.30	1,754.20	23,623.30	25,377.50

NEW JERSEY

County	Wheat			Corn-hog, 1934	All commodities		
	1933	1934	Total		1933	1934	Total
Atlantic.....				\$3,849.36		\$3,849.36	\$3,849.36
Bergen.....				6,083.57		6,083.57	6,083.57
Burlington.....				20,379.44		20,379.44	20,379.44
Canden.....				3,891.69		3,891.69	3,891.69
Cape May.....				2,530.61		2,530.61	2,530.61
Cumberland.....	\$228.80	\$497.51	\$726.31	1,015.86	\$228.80	1,513.37	1,742.17
Gloucester.....				58,239.59		58,239.59	58,239.59
Hudson.....				40,629.58		40,629.58	40,629.58
Hunterdon.....	3,576.00	4,299.58	7,875.58	3,034.36	3,576.00	7,333.94	10,909.94
Mercer.....		1,532.65	1,532.65	2,221.96		3,754.61	3,754.61
Middlesex.....	198.40	514.57	712.97	1,037.36	198.40	1,571.93	1,770.33
Monmouth.....				4,991.21		4,991.21	4,991.21
Morris.....	52.40	297.74	350.14	3,725.36	52.40	4,023.10	4,075.50
Ocean.....				1,605.36		1,605.36	1,605.36
Passaic.....				2,865.58		2,865.58	2,865.58
Salem.....	296.60	571.47	868.07	847.01	296.60	1,418.48	1,715.08
Somerset.....	1,004.20	1,624.56	2,628.76	3,321.32	1,004.20	4,945.88	5,950.08
Sussex.....		572.78	572.78	2,227.77		2,800.55	2,800.55
Union.....				39.37		39.37	39.37
Warren.....	791.20	1,418.50	2,209.70	510.37	791.20	1,928.87	2,720.07
Total.....	6,147.60	11,329.36	17,476.96	165,066.73	6,147.60	176,395.09	182,543.69

Rental and benefit payments through Dec. 31, 1934—by States and countries—Continued

NEW MEXICO

County	Cotton			Wheat			Corn-hog, 1934	All commodities		
	1933	1934	Total	1933	1934	Total		1933	1934	Total
Bernalillo.....	---	---	---	---	---	---	\$1,388.00	---	\$1,388.00	\$1,388.00
Catron.....	---	---	---	---	---	---	174.00	---	174.00	174.00
Chaves.....	---	---	---	---	---	---	3,707.00	---	100,405.76	174,009.36
Colfax.....	\$73,663.60	\$96,638.76	\$170,302.36	---	---	---	16,444.05	\$73,663.60	24,937.18	24,937.18
Curry.....	4,776.50	316.22	5,092.72	\$167,307.44	\$3,493.13	\$8,493.13	32,291.21	172,083.94	257,359.41	429,443.35
De Baca.....	---	---	---	---	---	---	2,893.55	110.00	2,893.55	3,003.55
Dona Ana.....	110.00	---	---	---	---	---	2,893.52	84,043.30	263,331.65	352,374.95
Eddy.....	84,043.30	349,481.43	---	---	---	---	1,822.85	114,843.50	129,488.76	243,832.26
Eldorado.....	114,343.50	242,665.91	242,009.41	---	---	---	419.15	---	---	419.15
Grant.....	---	---	---	---	---	---	22.50	---	2,837.35	2,837.35
Guadalupe.....	---	---	---	---	---	---	20,213.52	1,472.00	91,643.69	93,115.69
Harding.....	1,472.00	---	---	---	---	---	859.85	---	1,142.76	1,142.76
Hidalgo.....	---	---	---	---	---	---	4,237.70	5,526.00	6,627.02	12,153.02
Lea.....	5,526.00	2,389.32	7,915.32	---	---	---	1,887.70	---	1,887.70	1,887.70
Lincoln.....	---	---	---	---	---	---	---	---	1,492.40	1,492.40
McKinley.....	---	---	---	---	---	---	1,999.90	---	1,999.90	1,999.90
Mora.....	---	---	---	---	---	---	---	---	2,496.59	4,396.59
Otero.....	1,900.00	2,496.59	4,396.59	---	---	---	23,384.27	1,900.00	276,309.61	292,473.61
Quay.....	16,164.00	4,983.83	21,147.83	---	---	---	413.05	16,164.00	413.05	413.05
Rio Arriba.....	---	---	---	---	---	---	33,672.11	---	53,584.17	111,003.17
Roosevelt.....	57,419.00	11,616.69	69,035.69	---	---	---	4,524.95	57,419.00	7,706.39	7,706.39
San Juan.....	---	---	---	---	---	---	3,606.05	---	4,471.47	4,471.47
San Miguel.....	---	---	---	---	---	---	1,081.70	---	1,081.70	1,081.70
Santa Fe.....	---	---	---	---	---	---	46.88	---	1,053.88	1,053.88
Sierra.....	1,007.00	---	---	---	---	---	---	1,007.00	62,155.53	62,155.53
Union.....	---	---	---	---	---	---	47,918.21	---	---	---
Total.....	360,424.90	512,354.31	872,779.21	167,307.44	581,917.64	749,225.08	206,021.72	527,732.34	1,300,293.67	1,828,026.01

NEW YORK

County	Wheat			Tobacco			Corn-hog, 1934	All commodities		
	1933	1934	Total	1933	1934	Total		1933	1934	Total
Albany.....	---	---	---	---	---	---	\$5,028.05	---	\$5,028.05	\$5,028.05
Allegany.....	---	---	---	---	---	---	2,396.00	---	2,396.00	2,396.00
Broome.....	---	---	---	---	---	---	2,532.33	---	2,532.33	2,532.33
Cattaraugus.....	---	---	---	---	---	---	4,876.00	---	4,876.00	4,876.00
Cayuga.....	---	---	---	---	---	---	4,407.43	---	13,783.83	16,875.18
Total.....	---	\$2,478.49	\$2,478.49	\$3,091.35	\$6,897.91	\$9,989.26	4,407.43	\$3,091.35	---	---

Chautauqua	150.40	150.40	5,425.40	7,955.58	13,380.98	3,838.05	3,838.05
Chenung						3,356.87	16,888.25
Chenango						1,663.88	1,663.88
Clinton						1,276.40	1,276.40
Columbia	287.46	287.46				3,157.67	3,157.67
Cortland						309.35	309.35
Delaware						3,564.27	3,564.27
Dutchess						1,338.77	1,338.77
Erie	\$703.20	599.68	1,302.88			9,446.61	10,149.81
Essex						2,639.12	2,639.12
Franklin						1,819.08	1,819.08
Genesee	4,813.29	4,813.29				8,184.71	8,184.71
Greene						1,298.70	1,298.70
Herkimer						1,009.66	1,009.66
Jefferson						4,468.00	4,468.00
Lewis						211.17	211.17
Livingston	10,562.72	10,562.72				13,241.59	13,241.59
Madison						1,892.89	1,892.89
Monroe	5,481.20	5,481.20				10,942.45	10,942.45
Montgomery						56.00	56.00
Niagara	1,365.80	1,518.77	2,884.57			4,991.77	6,357.57
Oneida						4,930.67	4,930.67
Onondaga	839.95	839.95				19,315.24	27,418.62
Ontario	5,777.09	5,777.09	8,103.38	15,468.51	23,571.89	9,930.59	9,930.59
Orange						93.37	93.37
Orleans	1,288.20	1,006.20	2,294.40			1,288.20	7,069.80
Oswego			206.50	593.32	799.82	4,856.15	5,092.65
Otsego						709.99	709.99
Rensselaer						2,756.80	2,756.80
Rockland						85.38	85.38
Saratoga						5,243.15	5,243.15
St. Lawrence						4,211.37	4,211.37
Schenectady						717.55	717.55
Schoharie						562.05	562.05
Schuyler	1,146.40	318.80	1,465.20			2,042.40	3,188.80
Seneca		1,635.51	1,635.51			4,089.47	4,089.47
Stentben			3,822.00	5,863.26	9,685.26	10,951.76	10,951.76
Sullivan						1,031.38	1,031.38
Tioga						1,374.00	1,374.00
Tompkins		1,073.62	1,073.62			2,335.52	2,335.52
Ulster						402.00	402.00
Warren						178.00	178.00
Washington						1,835.60	1,835.60
Wayne		1,593.04	1,593.04			4,560.24	4,560.24
Yates	2,513.60	2,461.69	5,135.29			4,629.69	7,143.29
	3,142.80	480.34	3,623.14			3,623.14	3,623.14
Total	10,160.00	41,258.25	51,418.25	20,648.63	36,778.58	57,427.21	236,140.14
						30,808.63	205,331.51

Rental and benefit payments through Dec. 31, 1934—by States and counties—Continued
NORTH CAROLINA

County	Cotton			Wheat		Tobacco, 1934	Corn-hog, 1934	All commodities		
	1933	1934	Total	1933	1934			Total		
Alamance	\$3,670.73	\$3,686.31	\$7,357.04	\$708.20	\$738.82	\$1,507.02	\$9,586.80	\$4,438.93	\$49,274.43	\$53,713.36
Alexander	14,514.65	8,061.44	22,576.09				5,955.25	817.20	14,833.89	29,348.54
Alleghany							494.85	5,340.60	5,835.45	5,835.45
Anson							486.15	269.23	141,266.97	266,445.35
Ashe	125,178.40	140,511.59	265,689.99				675.80	5,019.25	126,178.40	5,695.05
Avery							90.00	100.75	190.75	190.75
Beaufort	15,882.75	19,938.98	35,821.73				110,709.22	28,862.32	15,882.75	175,393.27
Bertie	31,183.92	51,183.88	82,367.80				63,023.44	31,183.92	115,730.38	146,914.30
Bladen	20,366.84	19,862.34	40,229.18				105,275.30	7,371.83	132,509.47	152,876.31
Brunswick		594.27	594.27				38,317.62	5,845.23	44,757.12	44,757.12
Buncombe							6,042.50	5,512.40	6,554.90	6,554.90
Burke	429.00	837.27	1,266.27		1,591.86	1,591.86		429.00	2,429.13	2,858.13
Cabarrus	28,959.81	56,506.96	85,466.77				2,598.75	44.23	28,959.81	85,511.00
Caldwell		35.31	35.31	1,159.80	1,694.51	2,854.31		1,407.20	3,561.50	6,895.57
Camden	3,561.50	5,758.89	9,320.39					6,272.51	1,561.50	15,592.90
Carters		893.75	893.75					495.60	14,816.65	14,816.65
Caswell								305.60	77,733.56	77,733.56
Catawba	32,279.85	43,512.69	75,792.54	2,204.60	2,908.65	5,113.25	13,427.30	522.40	34,484.45	46,943.74
Chatham	14,695.94	24,209.09	38,905.03	483.60	618.80	1,102.40	18,593.95	856.65	15,170.54	44,278.49
Cherokee								100.25	100.25	100.25
Chowan	10,866.25	18,269.74	29,135.99				2,740.33	13,674.72	34,684.79	45,551.04
Clay							126.00	63.00	175,062.93	175,062.93
Cleveland	172,844.36	209,471.25	382,315.61				382,473.08	924.63	172,844.36	383,240.24
Columbus	3,897.22	6,397.72	10,294.94				113,842.05	1,929.49	3,897.22	390,800.29
Craven	13,340.20	10,765.74	24,105.94				37,947.08	6,260.50	13,340.20	130,868.29
Cumberland	74,324.93	116,561.51	190,886.44					2,432.95	156,941.54	231,266.47
Currituck	1,111.00	2,074.66	3,185.66					8,982.97	1,111.00	11,057.63
Davidson	19,332.41	9,322.97	28,655.38	2,070.00	2,982.96	5,052.96	21,092.00	2,619.63	36,017.56	57,419.97
Davie	16,849.77	15,952.84	32,802.61		720.10	720.10	5,822.25	1,337.48	23,832.67	40,682.44
Duplin	28,080.52	43,177.21	71,257.73				180,640.16	12,346.81	28,080.52	236,164.18
Durham	1,686.50	1,800.83	3,487.33		48.00	48.00	31,608.75	187.00	33,644.58	35,331.08
Edgecombe	100,125.90	121,947.13	222,073.03				170,493.17	3,430.60	100,125.90	395,996.80
Forsyth		249.10	249.10		2,078.36	2,078.36	43,172.50	275.18	295,870.90	395,996.80
Franklin	40,824.89	87,297.72	128,122.61				90,904.77		45,775.14	45,775.14
Gaston	77,575.32	81,183.57	158,758.89					44.24	178,262.49	219,057.38
Gates	13,673.57	20,449.82	34,123.39		2,394.49	2,394.49		77,575.32	83,622.40	161,197.62
Granville	5,715.34	7,761.47	13,476.81				1,138.18	11,281.77	13,673.57	46,743.34
Greene	28,307.34	28,117.93	56,425.27				124,411.98	213.55	5,715.34	132,387.00
Guilford	2,574.31	2,081.78	4,656.09	2,059.60	2,612.67	4,672.27	186,286.66	28,307.34	214,404.59	242,711.93
							67,204.92	1,936.59	4,633.91	73,835.96

Halifax	131, 189.67	166, 413.63	297, 603.30	48, 734.97	4, 936.25	131, 189.67	220, 084.85	351, 274.52
Harriet	39, 013.46	171, 170.62	210, 184.08	127, 771.11	1, 291.00	39, 013.46	300, 232.73	339, 246.19
Haywood				9, 310.00	2, 123.27		11, 436.27	11, 436.27
Henderson							1, 142.05	1, 142.05
Hertford	19, 756.89	31, 518.99	51, 275.88	32, 208.02	2, 207.77	19, 756.89	65, 934.78	85, 691.67
Hoke	73, 719.00	123, 365.09	197, 084.09	23, 522.77		73, 719.00	146, 887.86	220, 006.86
Hyde	7, 901.81	9, 900.81	9, 900.81		19, 707.21	1, 189.00	27, 600.02	28, 798.02
Iredell	86, 225.91	92, 268.17	178, 494.08		1, 399.64	86, 225.91	105, 020.15	191, 246.09
Jackson				7, 586.37	24.00		128.00	128.00
Johnston	74, 588.24	195, 194.38	269, 782.62	3, 766.00	104.00	74, 588.24	463, 948.77	538, 537.01
Jones	10, 731.70	10, 458.30	21, 190.00	268, 406.74	347.65	10, 731.70	98, 331.35	109, 063.05
Lee	11, 471.50	36, 648.18	48, 119.68	83, 742.40	87.30	11, 471.50	73, 266.01	84, 737.51
Lenoir	32, 332.48	37, 208.44	69, 540.92	36, 530.53	87.30	32, 332.48	261, 486.40	293, 818.88
Lincoln	39, 952.47	105, 478.72	145, 431.19	223, 001.11	1, 276.85	39, 952.47	113, 139.92	133, 052.39
McDowell				7, 614.00	372.05		372.05	372.05
Macon				26.00	637.65		663.65	663.65
Madison				29, 877.91			29, 877.91	29, 877.91
Martin	21, 777.39	23, 748.67	45, 526.06	118, 021.96	4, 544.60	21, 777.39	146, 315.23	168, 092.62
Mecklenburg	86, 885.72	138, 675.39	225, 561.11		254.24	86, 885.72	138, 929.63	225, 815.35
Mitchell				2, 346.11	1, 222.35		3, 568.46	3, 568.46
Montgomery	10, 570.15	21, 557.37	32, 127.52	4, 255.74	44.24	10, 570.15	25, 857.35	36, 427.50
Moore	3, 209.20	10, 317.21	13, 526.21	30, 294.96	656.40	3, 209.20	41, 268.57	44, 477.57
Nash	84, 025.91	121, 899.51	205, 925.42	217, 035.75	1, 787.50	84, 025.91	340, 722.76	424, 748.67
New Hanover				736.44	736.44		1, 093.02	1, 093.02
Northampton	96, 789.04	129, 079.19	225, 868.23	1, 071.80	1, 837.85	96, 789.04	131, 988.90	228, 777.94
Onslow	7, 795.50	8, 644.28	16, 439.78	87, 620.68	4, 356.14	7, 795.50	100, 621.10	108, 416.60
Orange	2, 820.25	3, 130.11	7, 950.36	24, 676.75	1, 164.40	2, 820.25	32, 758.48	36, 754.33
Paullico	8, 490.98	12, 085.26	20, 576.24	4, 937.83	11, 390.30	8, 490.98	28, 413.39	36, 904.37
Pasquotank	6, 500.46	5, 600.71	12, 141.17	19, 546.82	6, 540.46	6, 540.46	25, 147.53	31, 687.99
Pender	6, 910.39	4, 600.16	11, 510.55	28, 182.25	14, 909.99	6, 910.39	47, 092.40	54, 602.79
Perquimans	10, 674.90	16, 885.72	27, 561.62	7, 492.57	7, 492.57	10, 674.90	24, 379.29	35, 054.19
Persons	30.00	55.20	85.20	83, 549.20	364.40	30.00	83, 908.80	83, 908.80
Pitt	56, 369.69	75, 259.29	131, 628.98	392, 027.24	3, 825.10	56, 369.69	471, 111.63	527, 481.32
Polk	14, 179.47	17, 964.71	32, 144.18		200.70	14, 179.47	18, 165.41	32, 344.88
Randolph	2, 172.28	2, 000.31	4, 262.59	19, 109.24	2, 527.39	2, 172.28	25, 990.13	30, 320.81
Richmond	37, 219.62	53, 595.51	90, 815.13	9, 789.95	44.24	37, 219.62	63, 429.70	100, 649.32
Robeson	170, 742.24	222, 784.55	383, 526.79	531, 745.82	4, 567.44	170, 742.24	759, 097.81	929, 840.05
Rockingham				115, 815.11	1, 319.49		117, 134.60	117, 134.60
Rowan	53, 401.55	79, 825.43	133, 226.98		638.24	59, 828.75	85, 223.79	145, 052.54
Rutherford	103, 579.19	145, 949.51	249, 519.22	11, 108.07	1, 581.30	103, 579.19	147, 748.33	251, 327.52
Sampson	64, 800.05	159, 319.60	224, 119.65	152, 000.36	5, 642.09	64, 800.05	136, 962.05	281, 762.10
Scotland	73, 544.15	124, 877.39	198, 421.54	5, 398.08	58.00	73, 544.15	130, 333.47	203, 877.62
Stanly	23, 840.34	16, 741.07	40, 581.41	1, 078.23	123.74	23, 840.34	17, 943.04	41, 783.38
Stokes				582.11	44.24		99, 505.28	99, 505.28
Surry				425.88	523.60		84, 628.26	85, 151.86
Transylvania					1, 399.85		1, 399.85	1, 399.85
Tyrell					16, 471.10		17, 701.11	17, 701.11
Union	144, 043.10	173, 979.10	318, 022.20	26.25	44.24	144, 043.10	174, 049.39	318, 032.69
Vance	18, 131.52	23, 276.41	41, 407.93	71, 960.18	219.00	18, 131.52	95, 455.59	113, 587.11
Wake	59, 086.02	92, 551.61	152, 237.63	174, 067.24	3, 981.26	59, 086.02	270, 600.11	330, 286.13
Warren	62, 796.07	88, 190.48	150, 986.55	33, 748.75		62, 796.07	121, 939.23	134, 735.30
Washington	3, 492.12	5, 837.59	9, 329.71	6, 849.17	11, 102.15	3, 492.12	23, 788.91	27, 281.03

Rental and benefit payments through Dec. 31, 1934—by States and counties—Continued

NORTH CAROLINA—Continued

County	Cotton			Wheat		Tobacco, 1934	Corn-hog, 1934	All commodities		
	1933	1934	Total	1933	1934			1933	1934	Total
Watauga	\$87,649.62	\$102,419.02	\$190,068.64			\$1,251.68	\$1,976.25		\$3,227.93	\$3,227.93
Wayne						199,726.57	3,431.30		305,576.89	393,226.51
Wilkes	63,375.37	85,767.74	149,143.11		\$1,278.80	4,688.75	5,740.69	\$87,649.62	11,718.54	11,718.54
Wilson						267,495.87	47,436.15	63,375.37	353,699.76	417,075.13
Yadkin	1,079.69	852.19	1,931.88	\$2,249.80	2,941.50	54,930.75	2,653.05	3,329.49	61,377.49	64,706.98
Yancey						8,447.25	33.20		8,480.45	8,480.45
Total	2,808,645.32	4,281,957.84	7,090,603.16	21,271.40	48,924.39	5,658,055.02	323,125.01	2,829,916.72	10,312,062.25	13,141,978.93

NORTH DAKOTA

County	Wheat, 1934 ¹ (total)	Corn-hog, 1934 ¹	1934 total	County	Wheat, 1934 ¹ (total)	Corn-hog, 1934 ¹	1934 total
Adams	\$320,981.13	\$40,063.95	\$361,045.08	Mercer	\$341,455.05	\$15,327.71	\$356,782.76
Barnes	629,585.27	59,094.06	689,279.33	Morton	523,932.71	53,048.67	577,581.38
Benson	746,593.66	11,500.77	758,094.43	Mountrail	469,534.75	3,776.10	473,310.85
Billings	133,862.72	12,358.06	146,220.78	Nelson	388,106.33	6,794.27	394,900.60
Botineau	716,125.06	6,358.07	722,483.13	Oliver	175,002.69	19,278.41	194,281.10
Bowman	183,373.56	15,851.04	199,224.60	Pennington	392,938.48	4,004.78	396,943.26
Burke	276,334.34	4,925.62	281,259.96	Pierce	512,553.82	5,586.99	548,142.81
Burleigh	306,862.04	45,123.43	351,985.47	Ramsey	707,379.29	5,617.04	712,996.33
Cass	818,570.72	131,044.81	949,615.53	Ransom	212,412.63	05,662.91	281,075.59
Cavalier	682,623.14	7,472.21	690,095.35	Renville	356,969.84	4,224.45	361,194.29
Dickey	262,600.86	114,503.20	377,104.06	Richland	403,815.50	120,227.81	524,043.31
Divide	406,111.48	5,726.91	411,838.39	Rolette	306,734.35	5,441.76	312,176.11
Dunn	322,619.41	21,060.76	343,680.17	Sargent	269,844.15	87,361.86	357,206.01
Eddy	196,507.19	8,007.07	204,514.26	Sheridan	439,274.64	8,318.44	447,593.08
Emmons	577,560.32	72,161.36	649,721.68	Slope	130,409.66	19,301.52	149,711.18
Foster	193,711.30	10,517.07	204,228.37	Stark	211,683.05	14,961.65	226,644.70
Golden Valley	265,909.81	10,487.10	276,396.91	Steele	641,222.12	32,514.98	673,737.10
Grand Forks	430,639.28	9,506.67	439,945.95	Stutsman	201,461.80	6,665.22	208,127.02
Grant	438,327.81	54,558.67	492,886.48	Towner	749,294.22	58,061.31	807,355.56
Griggs	237,858.64	7,487.72	245,346.36	Washburn	528,430.93	2,265.80	530,696.73
Hettinger	557,709.07	34,382.73	592,091.80	Ward	320,873.30	16,993.97	337,867.27
Kidder	237,334.39	19,256.36	256,590.75	Wells	535,351.76	7,180.73	542,532.49
La Moure	462,803.74	82,709.62	545,513.36	Williams	694,512.58	4,561.87	699,074.45
Logan	367,962.80	14,101.97	382,064.77		662,763.26	17,705.30	680,468.56
McHenry	583,191.18	12,871.24	596,062.42		629,988.86	4,305.80	634,294.66
McIntosh	453,112.82	23,240.65	476,353.47	Total	22,960,318.33	1,455,555.90	24,415,874.23
McKenzie	437,960.23	5,489.23	443,449.46				
McLean	797,538.54	22,566.17	820,044.71				

¹ No payments made in 1933.

Rental and benefit payments through Dec. 31, 1934—by States and counties—Continued

OHIO

County	Wheat			Tobacco		Corn-hogs, 1934	All commodities			
	1933	1934	Total	1933	1934		Total	1933	1934	Total
Adams.....	\$2,709.80	\$1,035.85	\$3,745.65	---	\$24,656.76	\$24,656.76	\$31,874.69	\$2,709.80	\$67,567.30	\$70,277.10
Allen.....	4,512.80	7,170.42	11,683.22	---	---	---	183,315.83	4,512.80	190,486.25	194,999.05
Ashland.....	6,254.20	9,389.76	15,643.96	---	---	---	66,594.19	6,254.20	75,983.95	82,238.15
Ashubula.....	---	508.17	508.17	---	---	---	6,497.41	---	7,005.58	7,005.58
Athens.....	---	241.95	241.95	---	---	---	24,080.55	---	24,322.50	24,541.10
Auglaize.....	14,946.40	21,553.61	36,500.01	---	---	---	252,608.34	14,946.40	274,161.95	289,108.35
Belmont.....	150.40	25.73	176.13	---	---	---	9,185.58	150.40	9,211.31	9,361.71
Brown.....	3,081.20	3,759.55	6,840.75	---	---	---	57,505.26	3,081.20	101,659.40	104,740.60
Butler.....	36,119.20	63,075.91	99,195.11	---	---	---	164,383.77	38,860.20	231,199.85	270,060.65
Carrill.....	304.20	16.40	320.60	---	---	---	12,181.31	304.20	12,197.71	12,501.91
Champaign.....	20,888.20	30,764.93	51,653.13	72.00	---	72.00	275,194.43	20,890.20	303,959.36	326,889.56
Clark.....	27,730.00	36,604.39	64,354.39	---	---	---	166,101.31	27,750.00	202,705.70	230,455.70
Clermont.....	---	1,194.20	1,194.20	---	16,088.00	16,088.00	36,892.35	---	54,174.55	54,174.55
Clinton.....	31,062.00	43,561.99	74,623.99	---	182.99	182.99	397,587.66	31,062.00	441,332.64	472,394.64
Columbiana.....	1,562.20	473.97	2,036.17	---	---	---	18,385.08	1,562.20	18,859.05	20,421.25
Coshocton.....	1,591.00	520.30	2,111.30	---	---	---	44,795.06	1,591.00	45,315.36	46,906.36
Crawford.....	19,275.40	26,152.38	45,427.78	---	---	---	128,316.05	19,275.40	154,468.43	173,743.83
Cuyahoga.....	---	368.72	368.72	---	---	---	1,719.33	---	2,088.05	2,088.05
Darke.....	16,181.20	27,669.72	43,850.92	69,084.60	119,650.49	188,735.09	254,281.10	85,265.80	401,601.31	486,867.11
Defiance.....	9,417.80	4,780.43	14,198.23	---	---	---	102,040.81	9,417.80	106,801.24	116,219.04
Delaware.....	14,556.60	20,744.11	35,300.71	---	---	---	100,619.01	14,556.60	121,363.12	135,919.72
Erie.....	12,324.80	13,529.84	25,854.64	---	---	---	41,134.80	12,324.80	54,064.64	66,989.44
Fairfield.....	27,442.50	46,135.86	73,578.36	---	---	---	223,327.18	27,442.50	275,463.04	302,905.54
Fayette.....	18,672.60	32,523.62	51,196.22	---	---	---	299,016.33	18,672.60	331,539.95	350,212.55
Franklin.....	20,090.60	35,014.52	55,105.12	---	---	---	173,886.58	20,090.60	208,901.10	228,991.70
Fulton.....	16,851.60	23,374.49	40,226.09	---	---	---	126,686.04	16,851.60	150,060.53	166,912.13
Gallia.....	1,852.60	2,358.08	4,210.68	---	18,211.25	18,211.25	8,894.70	1,852.60	29,464.03	31,316.63
Geauga.....	---	474.89	474.89	---	---	---	3,801.16	---	4,276.05	4,276.05
Greene.....	33,894.80	58,128.73	92,023.53	1,389.90	1,390.57	2,780.47	369,229.23	35,284.70	428,748.53	464,033.23
Guernsey.....	---	25.74	25.74	---	---	---	9,389.83	---	9,415.57	9,802.37
Hamilton.....	---	5,176.31	5,176.31	---	1,204.99	1,204.99	19,808.00	---	23,183.30	26,189.30
Hancock.....	18,076.00	24,924.84	43,000.84	---	---	---	238,695.90	18,076.00	253,620.74	281,696.74
Hardin.....	9,343.40	9,727.80	19,071.20	---	---	---	263,086.51	9,343.40	272,814.31	282,157.71
Harrison.....	15.20	---	15.20	---	---	---	6,540.23	---	6,540.23	6,555.43
Henry.....	20,799.00	20,799.00	36,986.60	---	---	---	124,158.03	16,187.00	144,957.03	161,144.63
Highland.....	23,464.60	32,284.64	55,749.24	---	9,923.05	9,923.05	274,914.37	23,464.60	317,102.06	340,566.66
Hocking.....	1,619.22	1,619.22	2,871.22	---	---	---	17,805.64	1,252.00	19,424.86	20,676.86
Holmes.....	5,784.00	2,289.26	8,073.26	---	---	---	57,555.41	5,784.00	59,845.67	65,629.67
Huron.....	15,414.80	2,072.51	17,487.31	---	---	---	60,406.79	15,414.80	62,479.30	77,894.10
Jackson.....	597.80	214.75	812.55	---	1,090.31	1,090.31	7,076.17	597.80	8,381.23	8,979.03

Jefferson	136.00	23, 304.10	136.00	7, 039.56	136.00	7, 039.56
Knox	38, 171.50	195.38	38, 171.50	127, 050.75	14, 867.40	150, 354.85
Lake	195.38		195.38	2, 398.48		2, 593.86
Lawrence				2, 848.87	2, 848.87	4, 802.54
Licking	3, 579.41		16, 024.41	152, 609.20	12, 445.00	156, 188.61
Logan	2, 113.00		6, 887.20	132, 613.62	4, 774.20	134, 726.02
Loran	5, 374.84		9, 206.64	11, 983.26	3, 831.80	131, 390.82
Lucas	5, 326.38		19, 487.78	31, 533.57	14, 161.40	36, 559.95
Madison	29, 001.12		45, 111.32	360, 172.12	16, 110.80	389, 173.24
Mahoning	87.60		1, 072.60	6, 334.69	985.00	7, 427.29
Marion	44, 439.05		44, 439.05	245, 449.76		289, 888.81
Medina	7, 419.30		13, 734.70	13, 430.54	6, 315.40	20, 849.84
Meigs	1, 351.07		2, 363.27	15, 305.00	1, 012.20	17, 256.38
Mercer	26, 413.72		46, 041.12	215, 057.76	19, 627.40	241, 471.48
Miami	41, 299.15		68, 051.95	195, 794.27	57, 503.73	285, 741.22
Monroe	139.14		139.14	6, 317.20	6, 610.34	6, 610.34
Montgomery	30, 132.06		51, 173.66	96, 360.49	98, 109.00	234, 387.15
Morgan	75.02		143.62	5, 328.37	68.60	5, 403.39
Morrow	8, 436.98		14, 221.98	105, 071.76	5, 785.00	113, 508.74
Muskingum	115.83		1, 335.63	22, 339.22	1, 219.80	22, 455.05
Noble	362.21		362.21	563.60		22, 925.81
Ottawa	9, 762.73		14, 710.13	47, 080.47	4, 947.40	56, 843.20
Paulding	12, 803.20		21, 042.20	171, 345.92	8, 239.00	184, 149.12
Perry	6, 385.86		12, 689.46	38, 776.54	6, 303.60	45, 162.40
Pickaway	78, 631.10		126, 594.70	242, 368.43	47, 963.60	320, 999.53
Pike	3, 336.20		5, 081.50	43, 824.74	1, 745.30	47, 914.36
Portage	2, 594.20		5, 137.91	13, 183.84	2, 594.20	15, 727.55
Preble	62, 369.52		108, 805.72	239, 047.61	87, 763.10	366, 186.34
Putnam	77, 385.19		77, 385.19	340, 086.12	417, 471.31	453, 949.44
Richland	3, 516.12		19, 245.32	73, 251.69	15, 729.20	76, 767.81
Ross	38, 779.04		63, 566.34	160, 490.93	24, 787.30	225, 200.70
Sandusky	47, 651.49		79, 522.89	149, 075.48	31, 871.40	199, 726.97
Scioto	3, 635.53		3, 635.53	14, 866.07	23, 641.03	228, 598.37
Seneca	105, 663.48		166, 368.08	212, 925.91	60, 705.20	318, 389.39
Shelby	23, 784.48		40, 701.08	154, 551.47	18, 055.95	179, 420.30
Stark	2, 794.14		6, 335.74	17, 118.37	3, 541.60	19, 912.51
Summit	1, 224.20		1, 969.40	8, 402.49	745.20	10, 371.89
Tuscarawas	875.88		875.88	9, 125.47	10, 001.35	10, 001.35
Union	7, 519.67		15, 716.47	33, 745.41	8, 196.80	41, 265.08
Van Wert	8, 496.33		13, 717.73	162, 950.76	5, 221.40	171, 447.09
Vinton	445.35		2, 654.35	227, 501.38	2, 209.00	227, 946.73
Warren	321.86		528.66	8, 833.40	206.80	9, 415.58
Washington	439.80		439.80	153, 688.62	34, 846.10	215, 764.08
Wayne	56, 469.35		91, 939.15	10, 446.46	35, 469.80	120, 886.26
Williams	24, 994.95		44, 991.65	146, 304.85	19, 996.70	155, 649.46
Wood	51, 197.76		51, 197.76	152, 488.13	19, 996.70	171, 304.80
Wyandot	9, 009.47		20, 030.47	143, 991.41	11, 021.00	203, 685.89
Total	1, 509, 863.81	2, 464, 252.81	240, 214.38	751, 703.30	11, 480, 789.92	12, 675, 393.30

Rental and benefit payments through Dec. 31, 1934—by States and counties—Continued

OKLAHOMA

County	Cotton		Wheat		Corn-hog, 1934	All commodities		
	1933	1934	Total	1933	1934	Total	1933	1934
Adair	\$778.75	\$185.70	\$964.45		\$12,594.44	\$778.75	\$12,780.14	\$13,558.89
Alfalfa	920.00	1,014.90	1,934.90		52,438.03	920.00	916,519.80	917,439.80
Atoka	97,564.16	25,565.07	123,129.23		13,104.70	97,564.16	38,669.77	136,233.93
Beaver				\$337,957.80		337,957.80	620,727.70	967,085.50
Beckham	609,364.00	412,418.55	1,021,782.55		618,058.40	609,364.00	452,390.62	1,061,754.52
Blaine	238,274.14	87,595.01	325,799.15		94,271.16	238,274.14	482,150.41	720,424.55
Bryan	151,895.00	94,271.16	246,166.16		332,134.12	151,895.00	120,219.20	272,114.20
Caddo	670,577.50	332,852.97	1,003,430.47		106,054.12	670,577.50	482,887.03	1,153,464.53
Canadian	133,778.75	63,953.21	197,731.96		139,966.47	133,778.75	263,033.80	416,811.58
Cartier	149,018.05	51,562.63	200,580.68	86,026.60		239,805.35	396,199.64	600,511.24
Cherokee	21,739.95	9,157.54	30,897.49			149,018.05	87,716.68	139,931.84
Choctaw	77,255.22	74,436.19	151,691.41	204,311.60		21,739.95	77,255.22	155,507.37
Cimarron					375,315.34	13,280.49	72,852.00	329,938.99
Cleveland	72,852.00	42,508.46	115,360.46		5,114.52	19,456.86	171,242.56	363,343.56
Coal	85,200.00	46,894.27	132,094.27			23,413.10	172,986.55	74,123.70
Comanche	156,942.44	78,922.45	235,864.89			85,200.00	70,307.37	329,938.99
Cotton	192,101.00	61,780.00	253,881.00			72,852.00	171,242.56	363,343.56
Craig	1,820.75	1,799.06	3,619.81			192,101.00	171,242.56	363,343.56
Creek	211,021.10	107,552.02	318,573.12			1,820.75	72,302.95	74,123.70
Custer	239,237.50	138,504.19	377,741.69			211,021.10	153,483.48	364,504.58
Delaware	1,430.38	153.06	1,583.44			239,237.50	352,265.31	591,532.81
Dewey	161,110.00	53,167.27	214,277.27			45,335.22	66,951.80	68,412.18
Ellis	24,023.00	6,484.33	30,507.33			52,231.62	272,642.23	433,762.23
Garfield	4,860.40	1,120.24	5,980.64			45,287.51	478,173.51	502,196.51
Garvin	230,329.87	158,390.67	388,720.54			17,474.34	887,468.22	892,328.62
Grady	480,345.85	271,355.39	751,701.24			44,775.77	197,705.17	428,035.04
Grant						39,314.50	230,329.87	835,384.98
Greer	373,730.90	260,546.82	634,277.72			52,733.55	834,384.54	834,384.54
Harmon	393,385.50	217,915.96	611,301.46			65,095.57	296,152.80	669,883.70
Haskell						5,061.65	275,815.63	669,201.03
Hughes	105,048.06	57,387.69	162,435.75			17,613.85	514,694.12	514,694.12
Jackson	158,769.20	85,217.62	243,986.82			20,696.30	78,084.19	183,132.25
Jefferson	695,363.30	331,905.06	927,268.36			42,278.78	121,496.40	236,205.60
Johnston	193,112.00	99,138.69	292,250.69			13,247.98	112,396.67	305,498.67
Kay	65,013.48	33,178.35	98,191.83			193,112.00	65,013.48	305,498.67
Kearney	3,868.00	4,111.13	7,979.13			27,062.24	3,868.00	355,374.58
Kingfisher	54,462.33	30,376.31	84,838.64			115,814.39	54,462.33	759,910.10
Kiowa	447,103.10	284,914.57	732,017.67			99,592.00	447,103.10	972,205.73

Latimer	15, 439.86	6, 784.81	22, 224.67			10, 273.40	15, 439.86	17, 058.21	32, 498.07
LeFlore	126, 781.48	118, 475.36	245, 256.84			23, 608.57	126, 781.48	142, 083.93	268, 865.41
Logan	205, 485.25	97, 364.10	302, 849.35			12, 013.96	205, 485.25	109, 378.06	314, 863.31
Loomis	97, 377.50	51, 520.41	148, 897.91	43, 936.57			97, 377.50	120, 812.06	218, 192.56
Love	152, 146.50	51, 657.02	203, 803.52				152, 146.50	74, 598.00	226, 744.50
McClain	219, 122.25	118, 230.60	337, 252.85	1, 016.77			219, 122.25	142, 542.25	361, 565.02
McCurtain	230, 704.00	121, 948.95	352, 652.95				230, 704.00	129, 586.89	360, 290.89
McIntosh	144, 034.10	109, 039.60	253, 073.70				144, 034.10	133, 424.75	277, 458.85
Major	38, 073.00	10, 559.49	48, 632.49	357, 733.31			38, 073.00	397, 388.32	435, 461.32
Marshall	63, 537.50	40, 917.20	104, 434.70	1, 110.06			63, 537.50	71, 538.46	135, 075.96
Mayes	57, 504.50	25, 211.66	82, 716.16	15, 257.12			57, 504.50	116, 191.19	173, 695.69
Murray	101, 553.50	22, 879.38	84, 432.88				101, 553.50	37, 436.22	98, 989.72
Muskogee	308, 683.77	128, 738.24	467, 422.01				308, 683.77	188, 238.50	496, 922.27
Noble	21, 928.25	12, 997.86	34, 926.11	54.40			21, 928.25	165, 054.69	186, 982.94
Nowata	2, 857.75	1, 981.19	4, 838.94	113, 420.85			2, 857.75	39, 729.66	42, 587.41
Oklfuskee	159, 297.38	116, 833.19	276, 130.57	1, 517.40			159, 297.38	155, 688.05	314, 985.43
Oklahoma	69, 954.28	37, 606.56	107, 560.84	49, 802.88			69, 954.28	130, 764.73	180, 716.70
Oklmulgee	207, 109.50	109, 580.99	316, 690.49				207, 109.50	98, 521.70	337, 874.23
Osage	95, 928.50	29, 324.49	125, 252.99	3, 238.06			95, 928.50	49, 968.22	194, 450.20
Ottawa				11, 065.16				38, 903.06	49, 968.22
Paynee	85, 240.00	42, 130.24	127, 370.24	11, 065.16			85, 240.00	73, 278.22	158, 518.22
Payne	136, 066.50	61, 232.02	197, 298.52	234.60			136, 066.50	98, 245.95	234, 312.45
Pittsburg	181, 683.74	64, 432.24	247, 115.98	3, 000.88			181, 683.74	103, 519.11	285, 202.85
Pontotoc	92, 159.50	63, 738.05	165, 897.55				92, 159.50	99, 884.57	192, 044.07
Pottawatomie	143, 294.83	75, 077.32	218, 372.15				143, 294.83	91, 744.32	235, 039.15
Pushmataha	30, 786.21	18, 431.52	49, 217.73				30, 786.21	21, 069.05	51, 855.26
Roger Mills	269, 721.00	180, 004.85	449, 725.85	58, 432.45			269, 721.00	270, 341.33	540, 062.33
Rogers	37, 067.18	13, 120.34	50, 187.52	3, 806.42			37, 067.18	60, 706.63	97, 773.81
Seminole	90, 996.15	54, 585.36	145, 581.51				90, 996.15	53, 808.26	149, 884.41
Sequoyah	75, 089.00	37, 071.81	112, 160.81				75, 089.00	55, 909.97	128, 998.97
Stephens	222, 615.50	128, 948.14	351, 563.64				222, 615.50	58, 800.97	148, 884.41
Texas				4, 554.19				30, 633.10	53, 808.26
Tillman	591, 492.00	472, 476.45	1, 063, 968.45	865, 711.17			591, 492.00	164, 135.43	386, 750.93
Tulsa	47, 806.50	26, 633.01	74, 439.51	160, 271.31			47, 806.50	874, 514.87	1, 896, 082.67
Wagoner	173, 303.50	93, 585.29	266, 888.79	618.35			173, 303.50	649, 289.67	1, 240, 781.67
Washington				1, 606.57				39, 922.42	298, 874.73
Washington				2, 764.87				125, 571.23	207, 728.92
Washita				157, 228.19				28, 448.66	28, 448.66
Woods	707, 993.80	505, 094.42	1, 213, 088.22	157, 228.19			707, 993.80	687, 625.21	1, 395, 619.01
Woodward	102.00		102.00	648, 031.00			102.00	35, 911.93	683, 942.93
	10, 505.50	2, 826.16	13, 331.66	314, 590.73			10, 505.50	352, 935.57	363, 441.07
Total	11, 595, 657.46	6, 594, 471.66	18, 190, 129.12	9, 566, 709.21	10, 716, 573.01	2, 393, 608.92	12, 745, 521.26	18, 554, 789.79	31, 300, 311.05

Rental and benefit payments through Dec. 31, 1934—by States and counties—Continued
OREGON

County	Wheat			Corn-hog, 1934	All commodities		
	1933	1934	Total		1933	1934	Total
Baker.....		\$50,965.07	\$50,965.07	\$19,914.48		\$70,879.55	\$70,879.55
Benton.....		19,564.08	19,564.08	6,527.42		26,091.50	26,091.50
Clackamas.....		36,638.56	36,638.56	22,582.61		59,221.17	59,221.17
Clatsop.....		404.15	404.15	654.00		1,058.15	1,058.15
Columbia.....		4,848.97	4,848.97	4,377.68		9,226.65	9,226.65
Coos.....				3,616.22		3,616.22	3,616.22
Crook.....		13,793.01	13,793.01	1,673.36		15,466.37	15,466.37
Curry.....				1,724.22		1,724.22	1,724.22
Deschutes.....		4,446.54	4,446.54	3,351.43		7,797.97	7,797.97
Douglas.....	\$1,090.00	4,576.17	1,666.17	5,115.10	\$1,090.00	6,781.27	6,781.27
Gilliam.....		369,133.27	369,133.27	6,864.72		375,997.99	375,997.99
Grant.....				2,163.98		2,163.98	2,163.98
Harney.....				1,551.99		1,551.99	1,551.99
Hood River.....				1,334.50		1,334.50	1,334.50
Jackson.....				6,221.75		18,080.17	18,080.17
Jefferson.....		11,838.42	11,838.42	1,659.36		122,089.92	122,089.92
Josephine.....		120,430.56	120,430.56	1,442.10		3,076.63	3,076.63
Klamath.....		1,634.53	1,634.53	7,759.09		17,190.54	23,545.34
Leake.....	6,354.80	9,431.45	15,786.25	1,790.10	6,354.80	2,751.40	7,800.56
Lane.....	2,751.40	8,761.86	8,761.86	12,374.25	12,909.80	31,275.91	44,185.71
Lincoln.....	12,909.80	18,901.66	31,811.46	930.00		930.00	930.00
Linn.....		25,372.79	43,209.59	24,331.40	17,836.80	49,704.19	67,540.99
Malheur.....	17,836.80	21,584.48	21,584.48	16,202.56		37,787.04	37,787.04
Marion.....		49,144.13	33,700.26	33,700.26		82,844.39	82,844.39
Morrow.....		412,328.14	412,328.14	3,441.66		415,769.80	415,769.80
Multnomah.....				2,798.80		2,798.80	2,798.80
Polk.....	20,019.00	30,063.96	50,082.96	15,804.22	20,019.00	45,928.18	65,947.18
Sherman.....		552,456.41	552,456.41	7,084.50		559,540.91	559,540.91
Tillamook.....				6,612.00		6,612.00	6,612.00
Umatilla.....		1,254,279.90	1,254,279.90	16,198.59		1,270,478.49	1,270,478.49
Union.....		260,623.76	260,623.76	24,015.43		284,639.19	284,639.19
Walla.....		120,983.46	120,983.46	41,168.78		162,152.24	162,152.24
Wasco.....		289,021.66	289,021.66	15,977.00		304,998.66	304,998.66
Washington.....		46,741.73	46,741.73	21,697.90		68,439.63	68,439.63
Wheeler.....		9,597.58	9,597.58	1,061.48		10,659.06	10,659.06
Yamhill.....		78,551.95	78,551.95	21,783.70		100,335.65	100,335.65
Totals.....	60,961.80	3,819,386.85	3,880,348.65	366,106.64	60,961.80	4,185,553.49	4,246,515.29

PENNsylvania

County	Wheat			Tobacco			Corn-hog, 1934	All commodities		
	Total			Total				Total		
	1933	1934	Total	1933	1934	Total		1933	1934	Total
Adams		\$17,760.83	\$17,760.83				\$20,348.98			\$38,109.81
Allegheny		142.01	142.01				1,013.21			1,013.21
Armstrong		75.59	75.59				280.16			280.16
Beaver		2,575.69	4,610.89				910.16			985.75
Bedford	\$2,035.20	6,663.07	14,281.87				2,268.59			4,844.28
Berks	7,618.80	4,584.88	4,584.88	\$722.65	\$1,737.71	\$2,460.36	14,097.09	\$2,035.20	22,497.87	30,839.32
Blair		1,485.82	1,485.82				2,805.82	8,341.45	7,390.70	6,879.48
Bradford		4,195.90	4,195.90	295.40	762.60	1,058.00	1,872.65	235.40	4,121.07	7,390.70
Bucks		780.28	780.28				5,458.80	4,416.47	9,654.70	4,416.47
Butler		209.11	209.11				897.96			
Cambria		442.77	714.57				322.42			
Carbon	271.80	3,791.71	3,791.71				3,288.87	271.80	442.77	714.57
Centre		7,698.26	13,279.46				8,109.60			7,060.58
Chester	5,581.20	185.38	185.38	8,981.20	116.35	27,097.55	1,177.59	14,562.40	33,924.21	48,486.61
Clarion		1,993.81	1,993.81				24.00			
Clearfield		5,349.34	10,360.74				2,109.86			
Clinton		1,146.59	146.59	3,302.45	8,344.13	11,646.58	5,662.33	3,302.45	12,447.80	15,750.25
Columbia	5,011.40	11,235.49	17,932.09				1,609.19	5,011.40	11,011.67	16,023.07
Crawford	6,686.60	4,663.62	7,435.62				23,842.10			1,815.78
Cumberland	2,772.00			1,094.50	1,932.15	3,026.65	6,083.26	6,086.60	35,087.39	41,774.19
Dauphin							6,680.25	3,866.50	12,679.03	16,545.53
Delaware							292.00			
Elk		76.79	76.79				974.59			6,080.25
Erie		89.50	89.50							292.00
Fayette		121.86	121.86				1,051.38			1,051.38
Forest		37,039.23	64,870.63				746.01			746.01
Franklin	27,831.40	2,829.18	4,809.78				64,296.07			121.86
Fulton	1,980.60						3,524.55	27,831.40	6,353.73	92,127.47
Greene							6,131.80	1,980.60	6,131.80	8,334.33
Huntingdon	369.80	810.19	1,179.99				5,913.73			6,723.92
Indiana		163.67	163.67				1,086.96	369.80	7,093.72	7,093.72
Jefferson		49,277.16	49,277.16				2,237.64			1,086.96
Juniata	660.20	127.56	127.56				2,327.64			2,401.31
Lancaster		4,292.78	7,451.38	148.80	346.23	495.03	1,827.76	809.00	2,362.44	3,171.44
Lawrence		3,158.60	3,158.60	234,505.38	605,647.35	890,152.73	21,292.28	284,505.38	676,216.79	960,722.17
Lebanon		4,742.20	8,716.42	4,135.45	9,935.75	14,071.20	525.46			653.02
Lehigh	2,203.60	3,605.49	4,809.09				2,960.26	7,294.05	17,188.79	24,482.81
Luzerne		3,426.63	3,426.63				2,186.97	4,742.20	6,161.19	10,903.39
Lycoming		518.85	518.85	661.80	1,513.47	2,175.27	2,559.65	2,203.60	3,165.14	5,308.74
Mercer		1,629.99	1,629.99				1,061.26	661.80	7,976.73	8,688.53
Mifflin							129.27	1,570.11	1,570.11	1,570.11
Monroe							210.55	1,759.26	1,759.26	1,759.26
Montgomery		479.83	479.83				15,027.70			15,507.53

County	Corn-hog, 1934	Total
Providence.....	\$2, 076.84	\$2, 076.84
Washington.....	100.00	100.00
Totals.....	2, 176.84	2, 176.84

NOTE.—No rental or benefit payments for 1933.

SOUTH CAROLINA

County	Cotton		Tobacco, 1934	Corn-hog 1934	All commodities		
	1933	1934			1933	1934	Total
Abbeville.....	\$90, 186.01	\$133, 888.84	.....	\$145. 10	\$90, 186.01	\$134, 033.94	\$224, 219.95
Aiken.....	147, 064.50	186, 806.79	.....	2, 606.20	147, 064.50	186, 412.90	336, 477.49
Allendale.....	46, 851.84	34, 673.70	.....	6, 618.32	46, 851.84	41, 292.02	88, 243.86
Anderson.....	326, 217.50	501, 953.54	.....	5, 635.95	326, 217.50	501, 953.54	828, 171.04
Bamberg.....	80, 556.34	73, 479.63	.....	4, 107.40	80, 556.34	79, 541.32	160, 097.66
Barnwell.....	105, 648.62	96, 441.70	.....	5, 368.06	105, 648.62	100, 549.10	206, 197.72
Beaufort.....	2, 771.25	3, 078.85	.....	.....	2, 771.25	8, 446.91	11, 218.16
Berkeley.....	12, 667.39	11, 308.01	960.88	6, 478.67	12, 667.39	18, 747.56	31, 414.95
Calhoun.....	99, 163.68	97, 751.13	.....	9, 239.25	99, 163.68	106, 990.38	206, 154.06
Charleston.....	3, 595.02	2, 514.36	.....	4, 906.75	3, 595.02	7, 421.11	11, 016.13
Cherokee.....	91, 290.25	148, 978.02	.....	689.50	91, 290.25	149, 667.52	240, 927.77
Chester.....	124, 751.88	150, 828.13	.....	306.55	124, 751.88	151, 134.68	275, 886.56
Chesterfield.....	179, 734.25	197, 270.26	2, 560.21	1, 765.20	179, 734.25	201, 595.67	381, 329.92
Clarendon.....	132, 481.23	100, 860.91	73, 253.89	3, 919.05	132, 481.23	178, 133.95	310, 615.18
Colleton.....	57, 234.02	44, 386.56	.....	7, 000.27	57, 234.02	53, 966.25	111, 190.27
Darlington.....	116, 155.30	108, 417.97	158, 650.19	8, 488.42	116, 155.30	274, 516.76	390, 672.06
Dillon.....	112, 018.17	124, 038.06	179, 887.86	1, 699.00	112, 018.17	305, 624.92	417, 643.09
Dorchester.....	32, 439.71	37, 604.53	3, 567.53	4, 696.55	32, 439.71	45, 868.61	78, 308.32
Edgefield.....	96, 169.45	110, 866.18	.....	2, 722.30	96, 169.45	113, 588.48	209, 757.93
Fairfield.....	58, 903.72	61, 703.53	.....	1, 747.40	58, 903.72	63, 450.93	122, 354.65
Florence.....	87, 130.46	64, 676.05	414, 936.47	3, 520.85	87, 130.46	483, 133.37	570, 263.83
Georgetown.....	3, 818.00	4, 613.77	25, 099.39	1, 888.35	3, 818.00	31, 601.51	35, 419.51
Greenville.....	191, 749.13	293, 901.08	.....	32.00	191, 749.13	293, 933.08	485, 682.21
Greenwood.....	92, 629.34	90, 651.56	.....	1, 819.20	92, 629.34	92, 470.76	185, 100.10
Hampton.....	50, 010.50	43, 472.98	.....	18, 464.52	50, 010.50	61, 937.50	111, 948.00
Horry.....	5, 401.50	5, 140.15	581, 832.76	564.65	5, 401.50	587, 537.56	592, 939.06
Jasper.....	9, 862.25	5, 636.21	.....	4, 897.30	9, 862.25	10, 303.51	20, 365.76
Kershaw.....	129, 664.35	127, 372.54	.....	3, 506.30	129, 664.35	130, 878.84	260, 543.19
Lancaster.....	98, 181.55	110, 595.01	.....	1, 977.50	98, 181.55	112, 572.51	210, 754.06

Rental and benefit payments through Dec. 31, 1934—by States and counties—Continued
SOUTH CAROLINA—Continued

County	Cotton		Tobacco, 1934	Corn-hog 1934	All commodities		
	1933	1934			1933	1934	Total
Laurens.....	\$164,826.00	\$251,057.69			\$164,826.00	\$252,005.64	\$416,831.64
Lee.....	157,945.67	146,988.28			157,945.67	165,124.68	323,070.35
Lexington.....	53,149.31	70,203.01	\$16,052.10		53,149.31	72,437.16	125,586.47
McCormick.....	49,112.50	57,256.57			49,112.50	58,278.12	107,390.62
Marion.....	39,134.68	65,121.53			39,134.68	252,193.83	291,328.51
Marlboro.....	158,765.09	190,299.14	186,314.40		158,765.09	199,968.62	358,733.71
Newberry.....	109,353.01	142,891.66	8,261.13		109,353.01	146,469.06	255,822.07
Oconee.....	93,149.45	154,227.33			93,149.45	154,299.18	237,448.63
Orangeburg.....	239,827.15	341,689.91			239,827.15	367,571.12	607,398.27
Pickens.....	105,593.97	154,916.06	943.04		105,593.97	154,916.06	260,510.03
Richland.....	47,955.09	44,154.32			47,955.09	49,156.27	97,111.36
Saluda.....	89,308.42	85,207.39			89,308.42	86,472.59	175,781.01
Spartanburg.....	282,616.97	482,712.77			282,616.97	483,601.87	766,218.84
Sumter.....	173,593.21	192,585.35			173,593.21	241,576.86	415,170.07
Union.....	96,888.00	129,622.98			96,888.00	129,737.98	226,615.98
Williamsburg.....	78,951.25	62,308.79			78,951.25	235,537.15	314,488.40
York.....	160,343.21	166,073.50			160,343.21	168,231.44	328,574.65
Total.....	4,684,930.19	5,710,226.33	1,860,774.64	177,061.94	4,684,930.19	7,748,062.91	12,432,993.10

SOUTH DAKOTA

County	Wheat		Corn-hog, 1934	All commodities		
	1933	1934		1933	1934	Total
Armstrong.....		\$723.09				\$1,884.51
Aurora.....		86,897.00			255,962.27	335,962.27
Beadle.....		198,204.23			348,014.43	348,014.43
Bennett.....		114,664.16			181,205.42	181,205.42
Ben Homme.....	\$12,501.80	25,917.29		\$12,501.80	178,634.76	191,136.56
Brookings.....	1,234.80	2,281.06		1,234.80	204,740.23	205,975.03

Brann	665,751.80	665,751.80	239,413.51	905,165.31
Brule	70,835.78	70,835.78	102,961.79	173,797.57
Buffalo	6,709.02	10,844.22	21,287.55	32,131.77
Butte	17,483.65	17,483.65	8,495.36	25,979.01
Campbell	273,210.19	273,210.19	42,406.66	315,676.85
Charles Mix	107,718.97	167,718.97	208,414.79	376,133.76
Clark	113,613.50	113,613.50	123,349.72	236,963.22
Clay	12,590.97	21,283.37	119,729.03	232,320.00
Codington	78,086.53	78,086.53	116,684.76	194,771.29
Corson	178,563.95	278,290.55	49,684.62	228,248.57
Custer	13,492.68	21,069.88	7,866.66	28,893.54
Dakota	40,255.92	40,255.92	99,794.05	140,009.97
Day	342,142.75	342,142.75	212,661.75	554,804.50
Deuel	4,507.77	6,629.97	93,131.07	97,638.84
Dewey	80,984.76	125,197.36	27,392.00	108,376.76
Douglas	63,886.25	63,886.25	107,925.65	152,589.36
Edmunds	341,049.71	341,049.71	113,859.97	171,811.90
Fall River	44,241.09	44,241.09	26,830.57	454,909.68
Faulk	159,114.20	241,270.00	84,766.70	71,071.66
Grant	110,701.71	110,701.71	107,295.93	243,880.90
Gregory	69,527.74	69,527.74	116,230.52	217,997.64
Haddon	84,067.41	84,067.41	37,278.82	185,758.26
Hamlin	32,562.97	32,562.97	86,092.95	121,346.23
Hand	214,776.52	214,776.52	121,127.44	118,655.92
Hanson	67,125.56	67,125.56	88,479.70	335,903.96
Harding	60,474.77	60,474.77	14,544.34	155,605.26
Hughes	48,799.86	48,799.86	29,018.97	75,019.11
Hutchinson	119,627.36	119,627.36	171,106.21	77,818.83
Hyde	33,091.75	47,250.15	28,529.09	290,733.57
Jackson	19,452.22	33,109.62	14,655.94	61,620.84
Jerauld	84,405.46	84,405.46	71,839.74	34,108.16
Jones	105,577.13	105,577.13	29,489.16	156,245.20
Kingsbury	49,639.43	49,639.43	162,530.63	135,036.29
Lake	4,124.79	5,729.59	8,654.30	212,170.06
Lawrence	19,586.53	19,586.53	229,025.38	171,024.67
Lincoln	450.12	567.72	8,654.30	172,629.47
Lynn	138,535.18	138,535.18	64,247.15	28,240.83
McCook	18,464.01	30,333.81	225,947.68	229,593.10
McPherson	212,976.01	342,800.21	55,221.11	202,782.33
Marshall	235,289.14	235,289.14	113,136.34	244,411.69
Meade	151,735.85	151,735.85	68,905.17	268,197.12
Mellette	46,604.31	46,604.31	87,741.00	348,425.48
Miner	18,197.43	27,635.03	41,136.69	220,641.02
Minnehaha	3,896.67	2,578.67	112,217.22	87,741.00
Moody	911.97	1,542.77	280,700.32	130,414.65
Pennington	132,254.43	132,254.43	43,638.91	139,852.25
Perkins	204,961.83	204,961.83	48,597.15	283,278.99
Potter	176,047.02	176,047.02	92,203.61	261,328.16
Roberts	284,782.70	284,782.70	174,837.43	175,893.34
Saunders	75,370.91	75,370.91	107,560.34	253,558.98
Shannon	51,103.40	51,103.40	19,480.31	268,250.63
Spink	413,819.41	625,050.61	151,296.33	459,620.13
Stanley	18,325.14	18,325.14	11,102.57	182,931.25
			211,231.20	70,583.71
				776,346.94
				29,427.71

Rental and benefit payments through Dec. 31, 1934—by States and counties—Continued

SOUTH DAKOTA—Continued

County	Wheat			Corn-hog, 1934	All commodities		
	1933	1934	Total		1933	1934	Total
Sully		\$151,034.48	\$151,034.48	\$66,480.91		\$217,515.39	
Todd		23,004.74	23,004.74	74,105.08		97,109.82	
Tripp		136,377.61	136,377.61	130,495.53		266,873.14	
Turner	\$1,044.00	3,355.26	4,399.26	341,591.27	\$1,044.00	344,946.53	
Union	13,975.20	19,744.50	33,719.70	281,798.41	13,975.20	301,842.91	
Walworth		252,939.14	252,939.14	53,741.41		306,680.55	
Washabaugh		32,367.91	32,367.91	21,101.39		53,469.30	
Washington		15,768.88	15,768.88	7,480.87		23,249.75	
Yankton	4,177.80	6,722.45	10,900.25	206,406.62	4,177.80	213,129.07	
Ziebach	24,947.20	47,077.39	72,024.59	16,624.93	24,947.20	63,702.32	
Total	699,725.60	7,096,585.44	7,796,311.04	7,201,670.93	699,725.60	14,298,256.37	
						14,997,981.97	

TENNESSEE

County	Cotton			Wheat		Tobacco, 1934	Corn-hog, 1934	All commodities			
	1933	1934	Total	1933	1934			Total	1933	1934	Total
Anderson.....											
Bedford.....	\$15,408.54	\$2,805.83	\$18,214.37	\$1,819.00	\$2,656.09	\$849.95	\$1,998.60	\$17,227.54	\$2,848.55	\$2,848.55	
Benton.....	21,092.38	14,290.89	35,383.27			877.00	46,435.28	21,092.38	32,774.20	70,001.74	
Bledsoe.....				264.40	234.78		14,754.92	264.40	36,188.57	57,280.95	
Blount.....				1,587.40	1,364.26		5,461.41	1,587.40	14,989.70	15,254.10	
Bradley.....	7,824.15	3,533.38	11,357.53	1,587.40	950.38	5,965.43	2,476.95	7,824.15	12,791.10	14,378.50	
Campbell.....						1,526.87	2,476.95	1,587.40	8,487.58	16,311.73	
Cannon.....						4,262.00	13,899.75	18,161.75	18,161.75	18,161.75	
Carroll.....	125,501.91	83.60	83.60	90.00	247.74	773.25	23,193.09	90.00	24,297.08	24,387.08	
Carter.....		93,740.19	219,242.10				8,265.95	125,501.91	102,006.14	227,508.05	
Cheatham.....							831.35		5,573.52	5,573.52	
Chester.....				371.60	1,235.05	3,507.12	6,337.55	371.60	20,197.62	20,569.12	
Clatsop.....					485.87	13,374.10	3,327.69	54,797.81	74,226.86	129,024.67	
Clatsop.....	54,797.81	70,899.17	125,696.98	143.00	228.75	19,165.89	1,249.25	143.00	20,643.89	20,786.89	

[illegible]

Rental and benefit payments through Dec. 31, 1934—by States and counties—Continued

TENNESSEE—Continued

County	Cotton			Wheat		Tobacco, 1934	Corn-hog, 1934	All commodities		
	1933	1934	Total	1933	1934			1933	1934	Total
Overton.....						\$431.00	\$8,749.70		\$9,180.70	\$9,180.70
Perry.....	\$869.73	\$332.19	\$1,201.92			1,146.45	27,370.30	\$869.73	27,702.49	28,572.22
Pickett.....						258.88	4,410.84		5,557.29	5,557.29
Polk.....	13,092.77	9,611.40	22,704.17	\$205.85	\$205.85	2,038.60	2,038.60	13,092.77	12,134.73	25,227.50
Punam.....				168.18	231.75	2,501.32	18,397.06	63.60	21,066.36	21,130.16
Rhea.....							6,766.43		6,766.43	6,766.43
Roane.....				572.40	1,004.00	2,333.90	10,196.65	431.60	13,102.95	13,534.55
Robertson.....				9,332.73	19,200.53	58,357.52	2,543.10	9,867.80	70,233.35	80,101.15
Rutherford.....	80,698.86	25,047.35	105,746.21	760.77	814.97	1,759.94	48,771.88	80,723.06	76,339.94	157,063.00
Scott.....							464.80		464.80	464.80
Sequatchie.....				107.00	308.00		4,305.51	201.00	4,412.51	4,613.51
Sevier.....				1,167.80	552.58	9,351.39	11,892.30	1,167.80	21,796.27	22,964.07
Shelby.....	220,045.01	275,977.97	496,022.98				589.00	220,045.01	276,566.97	496,611.98
Smith.....				700.18	1,664.18	28,134.18	44,707.20	964.00	73,541.58	74,505.56
Stewart.....				408.66	926.26	14,201.05	15,932.77	517.60	30,562.48	31,080.08
Sullivan.....				3,774.78	15,092.60	15,092.60	1,638.75		20,506.13	20,506.13
Sumner.....				1,682.92	2,945.92	57,140.63	30,497.65	241,849.75	88,902.20	90,584.20
Tipton.....	241,849.75	252,701.66	494,551.41				1,215.90	253,917.56	23,441.00	495,707.31
Trousdale.....						14,774.75	8,666.25	109.20	2,921.75	3,030.95
Union.....				129.64	238.84	2,792.11	228.30		9,733.20	9,733.20
Van Buren.....						9,504.90	6,910.07		6,910.07	6,910.07
Warren.....				1,129.67	2,374.67	162.00	24,650.20	1,245.00	25,941.87	27,186.87
Washington.....				2,073.55	5,881.95	27,248.11	6,099.25	3,808.40	33,420.91	39,229.31
Wayne.....				314.16	536.16		34,354.58	32,119.68	51,425.40	83,545.08
Weakley.....	31,897.68	16,756.66	48,654.34			1,321.58	33,953.36	23,911.04	61,368.83	85,279.87
White.....	23,911.04	26,093.89	50,004.93			1,238.00	15,827.82	421.60	17,432.08	17,854.28
Williamson.....				4,941.97	10,029.97	23,965.54	31,743.41	5,088.00	62,650.92	67,738.92
Wilson.....	168.00	105.17	273.17	428.27	1,561.47	11,045.62	64,214.44	1,301.20	75,793.50	77,094.70
Total.....	3,290,806.19	2,844,034.92	6,134,841.11	94,685.72	161,327.12	701,730.42	1,641,173.64	3,357,447.59	5,231,024.70	8,639,072.29

County	Cotton			Wheat			Corn-hog, 1934	All commodities		
	1933	1934	Total	1933	1934	Total		1933	1934	Total
Anderson.....	\$183, 194. 04	\$123, 079. 74	\$306, 273. 78	-----	-----	-----	\$10, 992. 20	\$183, 194. 04	\$134, 071. 94	\$317, 265. 98
Andrews.....	2, 479. 50	4, 843. 12	7, 322. 62	-----	-----	-----	1, 121. 30	2, 479. 50	3, 484. 92	5, 964. 42
Angelina.....	127, 307. 55	79, 589. 73	206, 897. 28	-----	-----	-----	4, 382. 46	127, 307. 55	83, 672. 19	211, 279. 74
Aransas.....	4, 903. 00	3, 815. 54	8, 718. 54	-----	-----	-----	1, 154. 17	4, 903. 00	3, 969. 71	8, 872. 71
Archer.....	34, 777. 00	14, 139. 05	48, 916. 05	-----	-----	-----	2, 297. 97	34, 777. 00	31, 193. 91	65, 970. 91
Armstrong.....	18, 251. 00	7, 293. 84	25, 546. 84	-----	-----	-----	8, 980. 21	18, 251. 00	33, 739. 12	51, 990. 12
Atascosa.....	160, 282. 50	79, 260. 82	239, 543. 32	-----	-----	-----	24, 694. 71	160, 282. 50	103, 955. 53	264, 238. 03
Austin.....	80, 135. 31	113, 898. 78	194, 034. 09	-----	-----	-----	11, 810. 13	80, 135. 31	115, 577. 58	195, 712. 89
Bailey.....	316, 445. 00	80, 398. 44	396, 843. 44	\$3, 461. 00	-----	-----	11, 810. 13	319, 906. 00	96, 368. 99	416, 274. 99
Bandera.....	1, 038. 50	-----	1, 038. 50	4, 160. 42	-----	7, 621. 42	4, 975. 35	1, 038. 50	4, 975. 35	6, 013. 85
Bascom.....	128, 663. 75	119, 307. 25	247, 971. 00	-----	-----	-----	3, 356. 75	128, 663. 75	126, 097. 95	254, 761. 70
Baytown.....	49, 440. 79	216, 625. 79	266, 066. 58	2, 434. 00	-----	2, 434. 00	4, 324. 05	167, 185. 00	66, 968. 39	234, 173. 39
Bee.....	184, 132. 50	91, 717. 89	275, 850. 39	14, 223. 55	-----	14, 223. 55	4, 117. 15	184, 132. 50	95, 835. 51	279, 967. 54
Bell.....	1, 185, 019. 08	1, 185, 019. 08	2, 370, 038. 16	-----	-----	-----	23, 237. 72	690, 127. 93	92, 481. 63	782, 609. 56
Bexar.....	98, 045. 00	58, 457. 97	156, 502. 97	4, 352. 76	-----	4, 352. 76	15, 920. 45	98, 045. 00	74, 378. 42	172, 423. 42
Blanco.....	19, 114. 50	5, 445. 06	24, 559. 56	-----	-----	-----	1, 048. 45	19, 114. 50	6, 493. 61	25, 608. 11
Borden.....	41, 883. 00	28, 110. 97	70, 993. 97	-----	-----	-----	1, 104. 24	41, 883. 00	30, 275. 21	72, 158. 21
Bosque.....	124, 726. 50	70, 626. 38	195, 352. 88	19, 182. 14	-----	19, 182. 14	12, 276. 92	124, 726. 50	102, 085. 44	226, 811. 94
Bowie.....	214, 941. 22	215, 424. 01	430, 365. 23	-----	-----	-----	5, 830. 95	214, 941. 22	221, 254. 96	436, 196. 18
Brazoria.....	60, 215. 03	50, 760. 13	110, 975. 16	-----	-----	-----	4, 683. 80	60, 215. 03	55, 443. 93	115, 658. 96
Brazos.....	169, 282. 06	159, 989. 10	329, 271. 16	-----	-----	-----	6, 639. 85	169, 282. 06	166, 628. 95	335, 911. 01
Brewster.....	400. 00	-----	400. 00	-----	-----	-----	-----	400. 00	-----	400. 00
Briscoe.....	131, 313. 50	46, 281. 83	177, 595. 33	66, 682. 21	-----	97, 482. 41	11, 826. 65	162, 113. 70	124, 790. 69	286, 904. 39
Brooks.....	4, 766. 37	7, 272. 37	12, 038. 74	-----	-----	-----	945. 80	4, 766. 37	5, 712. 17	10, 478. 54
Brown.....	145, 618. 00	49, 710. 39	195, 328. 39	28, 587. 41	-----	28, 587. 41	10, 338. 55	145, 618. 00	88, 636. 35	234, 254. 35
Burleson.....	184, 301. 00	208, 137. 05	392, 438. 05	-----	-----	-----	3, 215. 30	184, 301. 00	211, 552. 35	395, 853. 35
Burnet.....	102, 695. 35	78, 181. 95	180, 877. 30	-----	-----	-----	10, 944. 65	102, 695. 35	89, 126. 70	191, 821. 95
Caldwell.....	366, 648. 75	277, 663. 88	644, 312. 63	-----	-----	-----	6, 842. 90	366, 648. 75	284, 806. 78	651, 455. 53
Callahan.....	142, 219. 62	78, 043. 41	220, 263. 03	-----	-----	-----	997. 35	142, 219. 62	79, 010. 76	221, 230. 38
Callan.....	114, 927. 00	53, 397. 64	168, 324. 64	9, 983. 10	-----	9, 983. 10	6, 201. 60	114, 927. 00	69, 582. 34	184, 509. 34
Camerton.....	22, 858. 00	83, 521. 78	106, 379. 78	-----	-----	-----	5, 114. 45	22, 858. 00	88, 636. 23	111, 494. 23
Camp.....	55, 892. 09	29, 438. 38	85, 330. 47	-----	-----	-----	52. 00	55, 892. 09	29, 540. 38	85, 432. 47
Carson.....	3, 308. 00	287. 61	3, 595. 61	562, 477. 84	-----	562, 477. 84	13, 476. 83	3, 308. 00	576, 242. 28	579, 550. 28
Cass.....	183, 495. 97	223, 806. 40	407, 302. 37	370, 288. 80	-----	370, 288. 80	686. 00	183, 495. 97	242, 492. 40	425, 988. 37
Castro.....	93, 397. 00	21, 047. 92	114, 444. 92	-----	-----	-----	19, 801. 24	93, 397. 00	411, 137. 96	504, 534. 96
Chambers.....	7, 818. 50	8, 716. 98	16, 535. 48	-----	-----	-----	7, 818. 50	7, 818. 50	8, 716. 98	16, 535. 48
Cherokee.....	131, 182. 52	192, 911. 11	324, 093. 63	14, 880. 40	-----	14, 880. 40	4, 422. 70	131, 182. 52	197, 333. 81	328, 516. 33
Childress.....	437, 609. 00	139, 436. 06	577, 045. 06	-----	-----	-----	7, 126. 00	437, 609. 00	161, 443. 06	599, 052. 06
Clay.....	244, 616. 25	91, 095. 47	335, 711. 72	13, 006. 91	-----	25, 396. 71	13, 599. 24	257, 006. 05	117, 701. 62	374, 707. 67
Cochran.....	59, 286. 00	26, 804. 71	86, 090. 71	-----	-----	-----	6, 213. 55	59, 286. 00	49, 085. 26	108, 371. 26
Coke.....	123, 249. 93	48, 663. 78	171, 913. 71	10, 005. 61	-----	10, 005. 61	1, 201. 90	123, 249. 93	39, 165. 68	162, 415. 61
Coleman.....	299, 811. 00	195, 982. 25	495, 793. 25	-----	-----	-----	9, 018. 15	299, 811. 00	215, 096. 02	514, 907. 02
Collin.....	669, 711. 55	528, 832. 97	1, 198, 544. 52	50, 887. 67	-----	50, 887. 67	45, 434. 43	669, 711. 55	625, 155. 07	1, 294, 866. 62

Rental and benefit payments through Dec. 31, 1934—by States and counties—Continued
TEXAS—Continued

County	Cotton			Wheat			Corn-hog, 1934	All commodities		
	1933	1934	Total	1933	1934	Total		1933	1934	Total
Collingsworth.....	\$559, 124.50	\$268, 244.09	\$827, 368.59				\$16, 454.50	\$559, 124.50	\$284, 698.59	\$843, 823.09
Colorado.....	78, 288.25	71, 081.79	149, 370.04				54.00	78, 288.25	71, 135.79	149, 424.04
Comal.....	29, 866.50	12, 470.33	42, 345.83				6, 402.65	29, 866.50	18, 881.98	48, 748.48
Comanche.....	135, 788.97	42, 025.72	177, 814.69				1, 065.20	135, 788.97	72, 534.69	208, 323.66
Concho.....	218, 658.50	105, 773.54	324, 432.04				8, 341.42	218, 658.50	115, 377.66	334, 036.16
Cooke.....	135, 785.25	79, 443.00	215, 228.25				23, 655.20	135, 785.25	185, 963.30	321, 748.55
Corvett.....	304, 306.75	138, 668.88	442, 975.63				11, 282.00	304, 306.75	164, 091.37	468, 398.12
Cottle.....	286, 404.20	135, 481.91	441, 886.11				3, 917.95	286, 404.20	159, 399.86	445, 804.06
Crockett.....							107.25		107.25	107.25
Crosby.....	557, 184.00	167, 875.54	725, 059.54				14, 432.81	557, 184.00	221, 947.53	779, 131.53
Dallas.....	424, 539.09	333, 528.90	758, 067.99				85, 680.31	424, 539.09	227, 037.01	651, 576.10
Dawson.....	83, 252.25	290, 778.34	374, 030.59				15, 762.52	83, 252.25	361, 838.34	795, 859.83
Deaf Smith.....	1, 391.00	94.15	1, 485.15				16, 533.00	1, 391.00	307, 311.34	390, 563.59
Delta.....	265, 331.66	170, 820.04	436, 151.70				25, 394.37	265, 331.66	316, 935.44	492, 647.84
Denton.....	319, 093.01	161, 865.73	480, 958.74				1, 446.65	319, 093.01	172, 266.69	437, 598.35
De Witt.....	131, 750.69	114, 715.93	246, 466.62				24, 627.45	131, 750.69	217, 599.94	356, 618.69
Dickens.....	260, 184.50	113, 104.70	373, 289.20				12, 078.67	260, 184.50	126, 794.60	258, 545.29
Dimmit.....	2, 549.00	1, 543.74	4, 092.74				8, 656.02	2, 549.00	10, 199.76	12, 748.76
Donley.....	243, 371.00	133, 066.05	376, 437.05				14, 873.66	243, 371.00	166, 174.98	409, 545.98
Duval.....	31, 693.00	50, 430.31	82, 123.31				382.80	31, 693.00	50, 813.11	82, 506.11
Eastland.....	59, 919.00	15, 922.01	75, 841.01				13, 980.32	59, 919.00	29, 902.33	89, 821.33
Ector.....			679.74				276.00		955.74	955.74
Edwards.....							243.05		243.05	243.05
Ellis.....	976, 378.25	653, 294.92	1, 629, 673.17				3, 276.28	976, 378.25	659, 538.24	1, 638, 422.49
El Paso.....	84, 324.70	197, 495.18	281, 819.88				84, 324.70	84, 324.70	198, 389.93	282, 714.63
Erath.....	161, 314.00	38, 454.99	199, 768.99				9, 937.46	161, 314.00	48, 392.45	209, 706.45
Falls.....	631, 269.38	433, 088.44	1, 064, 357.82				7, 738.05	631, 269.38	440, 826.49	1, 072, 095.87
Fannin.....	389, 265.85	493, 158.45	882, 424.30				47, 627.51	389, 265.85	541, 918.33	1, 132, 740.58
Fayette.....	124, 832.09	193, 594.43	318, 426.52				782.55	124, 832.09	194, 376.98	319, 209.07
Fisher.....	420, 495.00	222, 875.01	642, 370.01				4, 742.44	420, 495.00	227, 117.45	647, 612.45
Floyd.....	256, 128.00	46, 795.58	302, 923.58				18, 053.56	256, 128.00	216, 325.48	584, 955.68
Forb.....	141, 400.00	47, 540.69	188, 940.69				2, 652.20	141, 400.00	103, 688.71	245, 088.71
Fort Bend.....	307, 575.25	311, 040.50	618, 615.75				2, 086.40	307, 575.25	313, 126.90	620, 702.15
Franklin.....	67, 185.79	46, 734.92	113, 920.71				3, 889.35	67, 185.79	50, 124.27	117, 310.06
Freestone.....	187, 919.25	113, 457.50	301, 376.75				20, 797.97	187, 919.25	134, 255.47	322, 174.72
Frio.....	32, 436.00	10, 621.67	43, 057.67				65, 214.03	32, 436.00	75, 835.70	108, 321.70
Gaines.....	40, 301.50	22, 532.09	62, 833.59				13, 183.15	40, 301.50	35, 715.24	76, 016.74
Galveston.....	4, 401.35	1, 171.67	5, 573.02				4, 401.35	4, 401.35	1, 171.67	5, 573.02

Garza.....	175,000.94	79,346.02	254,346.96	736.00	857.23	1,693.23	6,765.13	175,000.94	86,111.15	261,112.09
Gillespie.....	14,039.50	2,020.01	16,059.51				8,848.24	14,775.50	8,848.24	23,623.74
Glasscock.....	13,093.72	13,268.72	177,013.95				13,093.72	175.00	13,093.72	13,268.72
Goliad.....	75,803.95	177,013.95	177,013.95				84,395.85	101,210.00	84,395.85	185,605.85
Gonzales.....	349,689.63	106,464.85	516,164.48				19,794.13	349,689.63	186,258.98	535,948.61
Gray.....	224,523.61	68,990.36	706,120.41				191,987.50	191,987.50	301,393.78	495,515.73
Grayson.....	327,694.35	30,821.66	51,053.16				387,921.29	378,426.06	387,921.29	766,347.35
Gregg.....	141,445.61	178,933.61	320,379.22				20,231.50	30,821.66	30,821.66	51,053.16
Guadalupe.....	338,792.07	150,398.95	489,191.02				182,425.41	141,445.61	182,425.41	223,871.02
Hale.....	376,115.50	124,815.54	500,931.04				539,435.90	338,792.07	539,435.90	494,584.47
Hamilton.....	476,229.08	832,432.98	1,308,661.96				439,193.22	476,229.08	439,193.22	900,539.12
Hansford.....	109,258.50	60,757.84	170,016.34				67,939.84	109,258.50	67,939.84	177,198.34
Hardeman.....	293,162.00	105,663.60	398,825.60				262,616.12	293,162.00	262,616.12	440,108.52
Hardin.....	86,644.00	402.77	1,186.77				141,591.49	86,644.00	141,591.49	434,753.47
Harris.....	86,835.86	59,954.09	146,789.95				336.90	86,835.86	336.90	1,523.67
Harrison.....	168,379.13	210,740.07	379,119.20				4,374.10	168,379.13	4,374.10	150,914.05
Hartley.....	422,386.50	239,341.97	661,728.47				29,259.98	422,386.50	29,259.98	379,119.20
Haskell.....	126,791.81	60,975.01	187,766.82				8,100.70	126,791.81	8,100.70	175,855.50
Hays.....	83,225.00	32,852.35	116,077.35				108,797.40	83,225.00	108,797.40	669,829.17
Hempshall.....	229,936.96	135,710.26	365,647.22				13,684.50	229,936.96	13,684.50	194,084.72
Henderson.....	104,513.25	119,627.69	224,140.94				29,225.30	104,513.25	29,225.30	200,641.52
Hidalgo.....	706,994.47	507,548.66	1,214,543.13				104,513.25	706,994.47	104,513.25	384,872.52
Hockley.....	571,968.00	257,483.08	829,451.08				12,214.35	571,968.00	12,214.35	238,528.58
Hood.....	35,902.63	15,225.51	51,128.16				5,389.25	35,902.63	5,389.25	270,083.95
Honkins.....	279,146.10	166,435.36	445,581.52				20,614.76	279,146.10	20,614.76	56,517.41
Houston.....	235,235.14	232,305.30	517,600.44				10,583.20	235,235.14	10,583.20	456,149.72
Howard.....	218,902.50	143,645.74	362,548.24				1,340.25	218,902.50	1,340.25	518,940.69
Hudson.....	39,006.00	30,757.58	69,763.58				1,042.35	39,006.00	1,042.35	144,688.09
Hunt.....	603,086.24	479,567.41	1,082,653.65				139.00	603,086.24	139.00	363,590.59
Huntshire.....	3,471.00	3,430.08	6,901.08				13,357.50	3,471.00	13,357.50	69,902.58
Irion.....	44,666.00	15,844.85	60,510.85				4,514.00	44,666.00	4,514.00	152,257.79
Jack.....	238,776.75	107,473.18	346,249.93				3,471.00	238,776.75	3,471.00	7,005.08
Jackson.....	20,834.39	11,878.07	32,712.46				28,777.81	20,834.39	28,777.81	74,443.81
Jeff Davis.....	40.00		40.00				109,661.13	40.00	109,661.13	348,437.88
Jefferson.....	13,871.25	9,915.22	23,786.47				11,878.07	13,871.25	11,878.07	32,712.46
Jim Hogg.....	29,283.00	19,403.99	48,686.99				40.00	29,283.00	40.00	24,406.07
Jim Wells.....	66,245.00	72,377.21	138,622.21				10,534.82	66,245.00	10,534.82	24,406.07
Johnson.....	285,961.33	244,305.62	530,266.95				399.80	285,961.33	399.80	19,803.79
Jones.....	685,934.50	227,084.31	913,018.81				3,617.90	685,934.50	3,617.90	142,240.11
Karnes.....	383,829.00	193,158.69	576,987.69				12,926.45	383,829.00	12,926.45	258,999.98
Kaufman.....	535,157.41	358,295.91	893,453.32				8,572.94	535,157.41	8,572.94	929,583.88
Kendall.....	657.00		657.00				12,673.00	657.00	12,673.00	205,831.69
Kenedy.....	102,059.00	71,665.36	173,724.36				10,293.70	102,059.00	10,293.70	589,660.69
Kerr.....	5,476.00	3,934.19	9,410.19				846.00	5,476.00	846.00	963,747.02
Kimble.....	37,334.00	23,262.18	60,596.18				1,682.85	37,334.00	1,682.85	846.00
King.....	35,412.00	35,389.76	70,801.76				3,731.70	35,412.00	3,731.70	175,407.21
Kieberg.....	283,599.50	166,897.25	450,496.75				827.40	283,599.50	827.40	4,207.70
Knox.....							5,718.00		5,718.00	10,479.59
							709.80		709.80	23,971.98
							2,152.65		2,152.65	61,305.98
							6,415.30		6,415.30	37,542.41
							2,447.60		2,447.60	175,760.15
							2,447.60		2,447.60	459,359.65

Rental and benefit payments through Dec. 31, 1934—by States and counties—Continued
TEXAS—Continued

County	Cotton			Wheat			Corn-hogs, 1934	All commodities		
	Total			Total				Total		
	1933	1934		1933	1934			1933	1934	
Lamar	\$376, 306.56	\$303, 607.73	\$679, 914.29	\$47, 769.00	\$36, 848.75	\$54, 617.75	\$13, 455.60	\$376, 306.56	\$317, 063.33	\$693, 369.89
Lamb	1, 371, 423.75	357, 649.01	1, 729, 072.76		377.20		25, 988.16	1, 389, 192.75	420, 485.73	1, 809, 678.51
Lampasas	59, 630.60	32, 031.69	91, 662.29				8, 837.16	59, 630.60	41, 246.05	100, 876.65
La Salle	33, 738.00	5, 388.93	39, 126.93				17, 181.13	33, 738.00	22, 570.06	56, 308.06
Lavaca	45, 368.05	146, 401.84	191, 769.89				1, 333.25	45, 368.05	147, 735.09	193, 103.14
Lee	51, 500.00	63, 682.22	115, 182.22				3, 755.10	51, 500.00	67, 437.32	118, 937.32
Leon	175, 434.00	168, 715.89	344, 149.89				40, 298.82	175, 434.00	208, 984.71	384, 418.71
Liberty	35, 611.36	38, 792.82	74, 404.18				621.75	53, 611.36	39, 414.57	93, 025.93
Limestone	793, 322.50	366, 651.58	1, 161, 974.08				12, 900.75	793, 322.50	379, 562.33	1, 174, 874.83
Lipscomb	3, 079.00	768.29	3, 847.29				11, 596.84	161, 725.60	208, 786.39	370, 511.99
Live Oak	215, 459.00	65, 464.19	280, 923.19				5, 043.35	215, 459.00	70, 512.54	285, 971.54
Llano	22, 096.00	7, 859.89	29, 955.89				34, 406.77	22, 096.00	42, 266.66	64, 362.66
Lubbock	993, 860.10	414, 962.01	1, 408, 822.11				39, 161.20	993, 860.10	481, 083.37	1, 474, 943.47
Lynn	564, 396.00	318, 375.80	882, 771.80				19, 352.67	564, 396.00	338, 328.30	902, 724.30
McCulloch	221, 042.00	129, 832.04	350, 874.04				7, 983.49	221, 042.00	142, 146.25	363, 188.25
McLennan	807, 117.63	555, 057.95	1, 362, 175.58				17, 173.30	807, 117.63	581, 677.21	1, 388, 794.84
McMullen	25, 958.00	10, 832.42	36, 786.42				754.65	25, 958.00	11, 587.07	37, 545.07
Madison	161, 663.66	129, 404.92	291, 068.58				2, 591.12	161, 663.66	131, 996.04	293, 659.70
Marion	42, 141.52	44, 964.21	87, 105.73				1, 469.05	42, 141.52	46, 433.26	88, 574.78
Martin	20, 953.00	108, 231.29	129, 184.29				2, 164.45	20, 953.00	110, 395.74	131, 348.74
Mason	25, 991.50	14, 869.90	40, 861.40				25, 708.40	25, 991.50	40, 638.30	66, 629.80
Matagorda	103, 993.75	93, 538.73	197, 532.48				1, 086.20	103, 993.75	94, 624.93	198, 618.68
Maverick							628.00			
Medina	37, 392.00	8, 328.65	45, 720.65				58, 644.65	37, 392.00	66, 973.30	104, 365.30
Menard	12, 034.50	10, 643.80	22, 678.30				1, 347.28	12, 034.50	11, 991.08	24, 025.58
Midland	11, 874.50	46, 726.08	58, 600.58				1, 218.00	11, 874.50	47, 944.08	59, 818.58
Milam	525, 817.50	347, 634.15	873, 451.65				16, 257.60	525, 817.50	363, 891.75	889, 709.25
Mills	65, 478.44	27, 978.29	93, 456.73				11, 945.33	66, 884.04	40, 757.37	107, 641.41
Mitchell	322, 334.00	188, 520.68	510, 854.68				280.00	322, 334.00	189, 088.31	511, 422.31
Montague	125, 775.19	50, 659.04	176, 434.23				10, 810.09	125, 775.19	61, 469.13	187, 244.32
Montgomery	41, 670.09	39, 269.82	80, 939.91				1, 145.70	41, 670.09	40, 415.52	82, 085.61
Moore	45, 693.14	46, 264.74	91, 957.88				3, 935.85	45, 693.14	157, 035.31	202, 728.45
Morris	197, 207.80	95, 904.34	293, 112.14				1, 559.40	197, 207.80	47, 824.14	245, 031.94
Motley	205, 636.68	186, 222.86	391, 859.54				4, 561.00	205, 636.68	100, 465.34	306, 102.02
Naacogdoches	897, 101.70	592, 412.74	1, 489, 514.44				12, 331.25	897, 101.70	198, 604.11	1, 095, 705.81
Navarro	8, 166.48	8, 164.63	16, 331.11				10, 912.75	8, 166.48	533, 325.49	541, 491.97
Newton	218, 272.25	89, 738.29	308, 010.54				2, 866.00	218, 272.25	95, 687.15	313, 959.40
Nolan	917, 433.00	478, 182.56	1, 395, 615.56				18, 215.40	917, 433.00	497, 397.93	1, 414, 830.93

Ochiltree	677, 374.74	11, 395.80	665, 978.04	665, 978.94	677, 374.74
Oldham	122, 229.09	58, 100.60	115, 830.23	173, 990.83	180, 359.69
Orange	8, 212.47	2, 596.20	1, 644.30	1, 644.30	5, 615.97
Palo Pinto	3, 368.20	147, 101.38	1, 636.64	1, 636.64	33, 619.35
Panola	24, 920.55	48, 026.00	202, 209.93	202, 209.93	63, 658.61
Parker	186, 558.23	17, 192.79	2, 270.85	2, 270.85	65, 218.79
Parker	333, 679.31	106, 492.50	1, 636.64	1, 636.64	358, 960.26
Parnell	252, 467.76	13, 702.50	2, 270.85	2, 270.85	10, 839.43
Pecos	10, 839.43	76, 577.47	2, 270.85	2, 270.85	24, 541.93
Polk	82, 257.64	21, 628.80	55, 423.12	55, 423.12	188, 835.11
Potter	82, 257.64	21, 628.80	55, 423.12	55, 423.12	83, 802.67
Presidio	82, 257.64	21, 628.80	55, 423.12	55, 423.12	20, 548.67
Rains	82, 257.64	21, 628.80	55, 423.12	55, 423.12	148, 655.90
Randall	82, 257.64	21, 628.80	55, 423.12	55, 423.12	328, 081.92
Real	82, 257.64	21, 628.80	55, 423.12	55, 423.12	831.53
Red River	82, 257.64	21, 628.80	55, 423.12	55, 423.12	253, 836.87
Reeves	82, 257.64	21, 628.80	55, 423.12	55, 423.12	27, 196.73
Refugio	82, 257.64	21, 628.80	55, 423.12	55, 423.12	13, 674.23
Roberts	82, 257.64	21, 628.80	55, 423.12	55, 423.12	68, 115.27
Robertson	82, 257.64	21, 628.80	55, 423.12	55, 423.12	941, 967.27
Rockwall	82, 257.64	21, 628.80	55, 423.12	55, 423.12	74, 001.04
Runnels	82, 257.64	21, 628.80	55, 423.12	55, 423.12	132, 063.44
Rusk	82, 257.64	21, 628.80	55, 423.12	55, 423.12	661, 053.36
Sabine	82, 257.64	21, 628.80	55, 423.12	55, 423.12	318, 394.56
San Augustine	82, 257.64	21, 628.80	55, 423.12	55, 423.12	260, 479.11
San Jacinto	82, 257.64	21, 628.80	55, 423.12	55, 423.12	857, 085.31
San Juan	82, 257.64	21, 628.80	55, 423.12	55, 423.12	441, 820.73
San Patricio	82, 257.64	21, 628.80	55, 423.12	55, 423.12	85, 959.11
San Saba	82, 257.64	21, 628.80	55, 423.12	55, 423.12	144, 516.63
Schleicher	82, 257.64	21, 628.80	55, 423.12	55, 423.12	42, 086.75
Scurry	82, 257.64	21, 628.80	55, 423.12	55, 423.12	888, 355.42
Shackelford	82, 257.64	21, 628.80	55, 423.12	55, 423.12	237, 906.10
Shelby	82, 257.64	21, 628.80	55, 423.12	55, 423.12	59, 974.10
Sherman	82, 257.64	21, 628.80	55, 423.12	55, 423.12	27, 071.89
Smith	82, 257.64	21, 628.80	55, 423.12	55, 423.12	122, 516.03
Somervell	82, 257.64	21, 628.80	55, 423.12	55, 423.12	371, 163.03
Starr	82, 257.64	21, 628.80	55, 423.12	55, 423.12	51, 893.23
Stephens	82, 257.64	21, 628.80	55, 423.12	55, 423.12	352, 449.07
Sterling	82, 257.64	21, 628.80	55, 423.12	55, 423.12	452, 929.48
Stonewall	82, 257.64	21, 628.80	55, 423.12	55, 423.12	406, 301.61
Sutton	82, 257.64	21, 628.80	55, 423.12	55, 423.12	6, 702.43
Swisher	82, 257.64	21, 628.80	55, 423.12	55, 423.12	25, 761.67
Tarrant	82, 257.64	21, 628.80	55, 423.12	55, 423.12	35, 688.28
Tarrant	82, 257.64	21, 628.80	55, 423.12	55, 423.12	109, 129.53
Taylor	82, 257.64	21, 628.80	55, 423.12	55, 423.12	29, 713.66
Terry	82, 257.64	21, 628.80	55, 423.12	55, 423.12	4, 043.67
Throckmorton	82, 257.64	21, 628.80	55, 423.12	55, 423.12	2, 178.67
Throckmorton	82, 257.64	21, 628.80	55, 423.12	55, 423.12	83, 745.45
Throckmorton	82, 257.64	21, 628.80	55, 423.12	55, 423.12	247, 424.95
Tom Green	82, 257.64	21, 628.80	55, 423.12	55, 423.12	599, 112.49
Travis	82, 257.64	21, 628.80	55, 423.12	55, 423.12	82, 212.35
Trinity	82, 257.64	21, 628.80	55, 423.12	55, 423.12	108, 520.59
Trinity	82, 257.64	21, 628.80	55, 423.12	55, 423.12	187, 931.64
Tyler	82, 257.64	21, 628.80	55, 423.12	55, 423.12	368, 863.09
Upshur	82, 257.64	21, 628.80	55, 423.12	55, 423.12	683, 552.64
Uvalde	82, 257.64	21, 628.80	55, 423.12	55, 423.12	29, 190.82
Van Zandt	82, 257.64	21, 628.80	55, 423.12	55, 423.12	228, 975.62
Victoria	82, 257.64	21, 628.80	55, 423.12	55, 423.12	111, 091.70
	82, 257.64	21, 628.80	55, 423.12	55, 423.12	340, 354.30
	82, 257.64	21, 628.80	55, 423.12	55, 423.12	527, 653.46
	82, 257.64	21, 628.80	55, 423.12	55, 423.12	256, 819.71
	82, 257.64	21, 628.80	55, 423.12	55, 423.12	143, 352.08
	82, 257.64	21, 628.80	55, 423.12	55, 423.12	40, 999.01
	82, 257.64	21, 628.80	55, 423.12	55, 423.12	200, 669.09
	82, 257.64	21, 628.80	55, 423.12	55, 423.12	29, 680.99
	82, 257.64	21, 628.80	55, 423.12	55, 423.12	570, 566.81
	82, 257.64	21, 628.80	55, 423.12	55, 423.12	296, 208.98
	82, 257.64	21, 628.80	55, 423.12	55, 423.12	107, 853.73

Rental and benefit payments through Dec. 31, 1934—by States and counties—Continued

TEXAS—Continued

County	Cotton			Wheat		Corn-hog, 1934	All commodities		
	1933	1934	Total	1933	1934		1933	1934	Total
Walker.....	\$72,316.55	\$71,662.77	\$143,979.32	-----	-----	\$867.30	\$72,316.55	\$72,530.07	\$144,846.62
Waller.....	62,309.02	43,467.23	105,776.25	-----	-----	298.10	62,309.02	43,763.33	106,074.35
Ward.....	22,463.00	12,306.09	34,769.09	-----	-----	136.00	22,463.00	12,462.09	34,925.09
Washington.....	75,620.85	198,635.74	274,256.59	-----	-----	1,560.45	75,620.85	200,196.19	275,817.04
Webb.....	10,798.89	8,101.82	18,900.71	-----	-----	1,619.50	10,798.89	9,721.32	20,520.21
Wharton.....	266,464.01	288,687.17	555,151.18	-----	-----	7,177.25	266,464.01	295,864.42	562,328.43
Wheeler.....	360,383.88	274,808.69	635,192.57	-----	-----	17,337.35	360,502.28	301,399.30	667,901.58
Wichita.....	227,293.00	64,636.17	291,929.17	-----	-----	8,361.24	227,293.00	95,432.38	322,775.38
Wilbarger.....	307,545.50	264,650.74	572,196.24	-----	-----	1,115.00	307,545.50	270,451.41	577,996.91
Willacy.....	7,149.00	47,983.82	55,132.82	-----	-----	3,004.45	7,149.00	50,988.27	58,137.27
Williamson.....	708,137.66	532,682.20	1,235,819.86	-----	-----	26,926.42	708,137.66	559,608.62	1,262,746.28
Wilson.....	170,576.50	97,325.01	267,901.51	-----	-----	23,606.87	170,576.50	122,931.88	293,508.38
Wise.....	79,508.50	29,705.47	109,273.97	-----	-----	22,851.48	85,865.70	62,878.08	148,744.38
Wood.....	138,243.38	194,818.07	333,061.45	6,297.20	10,321.73	8,127.10	138,243.38	112,945.17	251,188.55
Yoakum.....	17,102.00	19,540.44	36,702.44	-----	-----	13,842.11	17,162.00	33,382.55	50,544.55
Young.....	146,781.79	47,885.82	194,667.61	-----	-----	7,697.45	146,781.79	67,410.80	214,192.59
Zapata.....	2,396.00	7,690.85	10,086.85	-----	-----	-----	2,396.00	7,690.85	10,086.85
Zavala.....	3,328.00	1,444.62	4,772.62	-----	-----	3,362.90	3,328.00	4,807.52	8,135.52
Total.....	42,970,646.63	27,340,849.42	70,311,496.05	1,610,230.74	6,215,436.97	7,825,667.71	44,580,877.37	35,760,774.71	80,341,652.08

UTAH

County	Wheat			Corn-hog, 1934	Sugar, 1934	All commodities		
	1933	1934	Total			1933	1934	Total
Beaver.....	-----	\$788.53	\$788.53	\$2,637.15	-----	-----	\$3,425.68	\$3,425.68
Box Elder.....	-----	238,781.36	385,809.76	10,874.67	-----	-----	249,656.03	396,684.43
Cache.....	-----	101,970.78	176,465.53	6,429.97	-----	-----	182,895.55	182,895.55
Carbon.....	-----	1,420.86	1,420.86	939.21	-----	-----	2,360.07	2,360.07
Daggett.....	-----	854.35	854.35	412.00	-----	-----	1,266.35	1,266.35
Davis.....	-----	2,510.00	4,988.20	2,987.54	-----	-----	5,506.54	7,975.74
Duchesne.....	-----	5,778.56	5,778.56	3,829.50	-----	-----	9,608.06	9,608.06

Emery.....	10, 884.75	10, 884.75	4, 227.57	15, 112.32
Garfield.....	1, 027.56	1, 497.56	608.20	1, 605.76
Grand.....	-----	-----	120.15	120.15
Iron.....	1, 454.79	1, 454.79	1, 853.60	3, 308.39
Juab.....	81, 702.12	81, 027.12	2, 718.65	83, 745.77
Kane.....	28, 601.12	23, 601.12	235.46	3, 398.39
Millard.....	6, 728.41	6, 728.41	6, 563.20	13, 291.61
Morgan.....	1, 012.53	1, 328.53	1, 008.80	1, 027.57
Piute.....	7, 134.45	3, 219.65	1, 215.85	83, 745.77
Rich.....	53, 471.98	68, 471.98	1, 660.00	1, 027.57
Salt Lake.....	7, 252.33	7, 252.33	7, 317.00	35, 224.42
San Juan.....	34, 868.74	34, 868.74	845.75	17, 427.21
Sampete.....	12, 284.85	21, 630.05	6, 006.30	2, 055.20
Sevier.....	2, 239.63	2, 289.63	7, 288.40	2, 055.20
Summit.....	19, 638.19	19, 638.19	1, 698.50	8, 098.08
Tooele.....	11, 916.92	11, 916.92	966.50	40, 875.64
Utah.....	86, 995.88	86, 995.88	3, 316.45	28, 918.45
Wasatch.....	6, 264.39	6, 264.39	10, 837.01	3, 987.63
Washington.....	3, 834.49	3, 834.49	2, 062.00	20, 604.69
Wayne.....	2, 833.21	4, 470.01	1, 208.97	15, 233.37
Weber.....	7, 572.15	13, 405.35	1, 448.00	97, 832.89
			1, 636.80	8, 326.39
			5, 836.20	5, 043.46
Total.....	243, 930.80	243, 930.80	8, 792.00	5, 918.01
				14, 252.40
				20, 088.60
				1, 096, 736.73

VERMONT

County	Tobacco		Total	All commodities		
	1933	1934		1933	1934	Total
Addison.....	-----	-----	-----	-----	\$827.65	\$827.65
Bennington.....	-----	-----	-----	-----	977.77	977.77
Caledonia.....	-----	-----	-----	-----	4, 294.17	4, 294.17
Chittenden.....	-----	-----	-----	-----	2, 494.25	2, 494.25
Essex.....	-----	-----	-----	-----	656.15	656.15
Franklin.....	-----	-----	-----	-----	5, 620.00	5, 620.00
Grand Isle.....	-----	-----	-----	-----	432.00	432.00
Lamoille.....	-----	-----	-----	-----	1, 788.00	1, 788.00
Orange.....	-----	-----	-----	-----	1, 192.50	1, 192.50
Orleans.....	-----	-----	-----	-----	3, 084.65	3, 084.65
Rutland.....	-----	-----	-----	-----	4, 130.00	4, 130.00
Washington.....	-----	-----	-----	-----	3, 185.75	3, 185.75
Windham.....	-----	-----	-----	-----	8, 284.43	10, 068.98
Windsor.....	-----	-----	-----	-----	1, 614.93	1, 614.93
Total.....	2, 384.45	6, 778.18	9, 162.63	2, 384.45	38, 582.35	40, 966.80

County

Rental and benefit payments through Dec. 31, 1934—by States and counties—Continued

VIRGINIA

County	Cotton			Wheat		Tobacco, 1934	Corn-hog, 1934	All commodities		
	1933	1934	Total	1933	1934			1933	1934	Total
Acomac							\$3,313.63	\$2,176.00	\$3,313.63	\$3,313.63
Albemarle							13,342.55		16,944.33	13,720.33
Allegheny							1,717.76		1,717.76	1,717.76
Amelia		\$11.13	\$11.13				466.45		9,186.44	9,186.44
Amherst					375.94		328.94		9,316.60	9,316.60
Appomattox					6,020.37		141.20		22,262.23	22,262.23
Augusta					66,850.27		49,291.24		116,141.51	173,596.31
Bath							3,957.28	57,454.80	3,957.28	3,957.28
Bedford							6,491.36		18,358.11	20,596.51
Bland							5,783.67	2,238.40	6,151.67	6,151.67
Botetourt							2,393.25		5,795.48	9,195.48
Brunswick							603.75		58,492.85	81,253.36
Buchanan	\$22,501.91	26,932.04	49,433.95	3,400.00	3,402.23	30,513.55		22,760.51	164.00	164.00
Buckingham					443.51				16,329.12	17,639.92
Campbell									23,502.60	26,025.80
Caroline									10,236.55	15,866.95
Carroll									16,043.15	16,706.55
Charles City									5,370.66	5,370.66
Charlotte	58.00	2,032.40	2,090.40	883.00	629.50	4,741.16			44,790.29	45,681.29
Cheslerfield		55.77	55.77						6,532.10	6,532.10
Clarke									33,711.55	42,230.95
Culpeper									32,081.77	42,646.77
Cumberland									15,367.32	16,893.32
Dickenson									182.00	182.00
Dinwiddie	1,573.25	2,976.62	4,549.87						24,570.25	26,143.51
Essex									9,000.17	13,109.37
Fairfax									17,111.45	19,828.65
Fauquier									65,585.63	81,659.68
Floyd									8,643.08	8,643.08
Fluvanna									6,871.55	7,736.75
Franklin									18,096.07	18,096.07
Frederick									35,285.43	43,011.43
Giles									4,674.25	4,674.25
Gloucester									3,538.05	3,538.05
Goode									1,333.80	1,333.80
Greene									12,142.02	13,475.82
Grayson									13,023.85	13,023.85
Greensville	22,441.00	39,306.52	61,747.52						7,714.37	7,753.24
									43,775.55	66,216.55

[illegible]

Rental and benefit payments through Dec. 31, 1934—by States and counties—Continued

VIRGINIA—Continued

County	Cotton			Wheat			Tobacco, 1934	Corn-hog, 1934	All commodities		
	1933	1934	Total	1933	1934	Total			1933	1934	Total
Westmoreland.....				\$3, 705.02	\$8, 864.52	\$17, 596.55		\$4, 579.46	\$8, 705.02	\$13, 470.99	\$22, 176.01
Wise.....							\$126.00			126.00	126.00
Wythe.....				5, 227.00	5, 906.50	11, 133.50	2.00	43, 712.06	5, 227.00	49, 620.56	54, 847.56
Total.....	\$128, 672.93	\$220, 451.36	\$349, 124.29	331, 340.19	457, 581.28	788, 921.47	708, 250.70	829, 124.56	400, 013.12	2, 215, 407.90	2, 675, 421.02

WASHINGTON

County	Wheat			Corn-hog, 1934	All commodities		
	1933	1934	Total		1933	1934	Total
Adams.....		\$708, 163.87	\$708, 163.87	\$2, 642.35		\$710, 806.22	\$710, 806.22
Asotin.....		147, 844.66	147, 844.66	11, 592.59		159, 437.25	159, 437.25
Benton.....		33, 203.42	33, 203.42	8, 591.95		41, 795.37	41, 795.37
Chelan.....		4, 546.96	4, 546.96	834.95		5, 381.91	5, 381.91
Clallam.....				3, 717.60		3, 717.60	3, 717.60
Clark.....		1, 866.60	1, 866.60	7, 434.44		9, 301.04	9, 301.04
Columbia.....		343, 310.67	343, 310.67	13, 638.82		356, 969.49	356, 969.49
Cowlitz.....				2, 302.80		2, 302.80	2, 302.80
Douglas.....		335, 965.01	335, 965.01	6, 959.65		342, 924.66	342, 924.66
Ferry.....		4, 948.17	4, 948.17	1, 310.47		6, 258.64	6, 258.64
Franklin.....		231, 659.68	231, 659.68	604.00		232, 263.68	232, 263.68
Garfield.....		318, 981.45	318, 981.45	13, 265.05		332, 246.50	332, 246.50
Grant.....		145, 151.73	145, 151.73	2, 066.51		147, 218.24	147, 218.24
Grays Harbor.....				2, 955.99		2, 955.99	2, 955.99
Island.....				1, 640.03	\$3, 766.40	6, 186.61	9, 953.61
King.....	\$3, 766.40	4, 546.58	8, 312.98	7, 488.93		7, 488.93	7, 488.93
Kitsap.....				374.00		374.00	374.00
Kittitas.....		14, 482.83	26, 908.03	9, 312.72	12, 325.20	23, 705.55	36, 120.75
Klickitat.....		231, 500.36	221, 500.36	18, 085.13		239, 625.49	239, 625.49
Lewis.....		9, 211.82	9, 211.82	8, 441.26		17, 653.08	17, 653.08
Lincoln.....		1, 031, 380.46	1, 031, 380.46	10, 706.31		1, 042, 140.77	1, 042, 140.77
Mason.....				646.00		646.00	646.00

Okanogan.....	28,628.95	6,273.50	34,902.45
Pend Oreille.....	1,759.95	1,152.65	2,912.60
Pierce.....	8,304.80	8,304.80	8,304.80
San Juan.....	1,168.00	1,168.00	1,168.00
Skagit.....	8,306.96	8,306.96	8,306.96
Skamania.....	1,240.30	1,240.30	1,240.30
Snohomish.....	3,054.02	3,054.02	3,054.02
Spokane.....	412,310.25	30,132.80	442,443.05
Stevens.....	31,924.55	16,406.38	48,332.93
Thurston.....	5,130.51	5,130.51	5,130.51
Wahkiakum.....	819,783.79	819,783.79	819,783.79
Walla Walla.....	1,183,293.07	1,183,293.07	1,183,293.07
Whitman.....	23,580.50	39,791.99	63,372.49
Yakima.....	16,091.60	388,351.48	6,446,456.81
Total.....	6,058,105.33	6,074,196.93	6,462,548.41

WEST VIRGINIA

County	Wheat		Tobacco, 1934	Corn-hog 1934	All commodities		
	1933	1934			1933	1934	Total
Barbour.....				\$2,500.69		\$2,500.69	\$2,500.69
Berkeley.....				13,149.03		27,126.89	38,444.09
Boone.....	\$11,317.20	\$13,977.86	\$1,426.02	46.95	\$11,317.20	1,472.97	1,472.97
Braxton.....				1,079.59		1,079.59	1,079.59
Brooke.....				1,645.99		1,645.99	1,645.99
Cabell.....		471.37	6,332.08	1,259.40		8,062.85	8,062.85
Calhoun.....			171.42	4,014.50		4,185.92	4,185.92
Clay.....				987.10		987.10	987.10
Doddridge.....				638.39		638.39	638.39
Fayette.....				761.20		761.20	761.20
Gilmer.....				668.99		668.99	668.99
Grant.....	1,283.60	305.17	1,588.77	4,169.05	1,283.60	4,474.22	5,757.82
Greenbrier.....	1,932.60	2,469.72	4,402.32	4,339.27	1,932.60	6,808.99	8,741.59
Hampshire.....	1,464.80	1,677.78	3,142.58	8,121.69	1,464.80	9,796.47	11,264.27
Hancock.....				140.09		140.09	140.09
Hardy.....	2,693.00	249.17		10,593.70	2,693.00	11,142.87	13,836.47
Harrison.....				3,183.99		3,183.99	3,183.99
Jackson.....			657.42	2,226.49		2,883.91	2,883.91
Jefferson.....	20,112.40	36,302.08	843.20	41,625.97	20,112.40	77,928.05	98,040.45
Kanawha.....				4,588.10		5,431.30	5,431.30
Lewis.....				1,287.99		1,287.99	1,287.99
Lincoln.....			10,974.02	557.65		11,531.67	11,531.67
Logan.....			664.02	46.95		710.97	710.97

Rental and benefit payments through Dec. 31, 1934—by States and counties—Continued

WEST VIRGINIA—Continued

County	Wheat			Tobacco, 1934	Corn-hog 1934	All commodities		
	1933	1934	Total			1933	1934	Total
McDowell.....					\$46.96		\$46.96	\$46.96
Marion.....					820.64		820.64	820.64
Marshall.....					4,135.19		4,135.19	4,135.19
Mason.....		\$6,693.76	\$6,693.76	\$2,574.67	8,312.75		17,881.18	17,881.18
Mercer.....					868.62		868.62	868.62
Mineral.....	\$663.60	616.07	1,279.67		1,231.15	\$663.60	1,897.22	2,560.82
Mingo.....					46.96		46.96	46.96
Monongalia.....					598.24		598.24	598.24
Monroe.....	1,466.00	1,437.72	2,903.72	575.20	4,202.07	1,466.00	6,214.99	7,680.99
Morgan.....	812.80	851.00	1,663.80		1,040.19	812.80	1,891.19	2,703.99
Nicholas.....					1,748.76		1,748.76	1,748.76
Ohio.....					534.15		534.15	534.15
Pendleton.....	1,326.40	362.98	1,689.38		6,280.70	1,326.40	6,643.68	7,970.08
Pleasants.....					493.50		493.50	493.50
Pocahontas.....					1,445.42		1,445.42	1,445.42
Preston.....					1,434.75		1,434.75	1,434.75
Putnam.....		168.69	168.69	10,225.21	1,300.16		11,694.06	11,694.06
Raleigh.....					46.96		46.96	46.96
Randolph.....					794.10		794.10	794.10
Ritchie.....					86.25		86.25	86.25
Roane.....				135.42	285.85		421.27	421.27
Summers.....	92.40	194.55	286.95		1,674.58	92.40	1,869.13	1,961.53
Taylor.....					36.25		36.25	36.25
Tucker.....					211.25		211.25	211.25
Tyler.....					853.65		853.65	853.65
Ursbur.....					2,323.55		2,323.55	2,323.55
Wayne.....				1,178.08	2,755.81		3,933.89	3,933.89
Webster.....					117.25		117.25	117.25
Wetzel.....					995.50		995.50	995.50
Wirt.....				136.00	708.05		844.05	844.05
Wood.....				70.00	853.35		923.35	923.35
Wyoming.....					46.96		46.96	46.96
Total.....	43,105.40	65,777.92	108,943.32	36,262.76	154,312.34	43,105.40	256,353.02	299,518.42

County	Wheat			Tobacco			Corn-hog, 1934	All commodities		
	1933	1934	Total	1933	1934	Total		1933	1934	Total
Adams							\$17,389.96		\$17,389.96	\$17,389.96
Ashland							570.00		570.00	570.00
Barron							8,563.35		9,106.30	9,188.30
Bayfield	\$85.40	\$126.12	\$211.52			\$624.95	85.40		3,217.11	3,302.51
Brown	162.20	840.20	339.07				49,541.14		49,718.01	49,880.21
Buffalo							102,894.27		104,990.97	105,522.07
Burnett	96.60	254.01	1,244.39				6,968.35		7,150.76	7,247.30
Calumet	478.80	765.79	1,230.33				25,342.00		26,107.79	26,386.39
Chippewa	35.20	85.13	120.33				20,259.37		25,911.03	25,911.03
Clark	199.40	274.60	474.00				17,680.05		27,435.08	27,694.48
Columbia	273.00	410.95	683.95				140,501.26		182,917.99	204,034.48
Crawford		166.34	196.34				17,690.05		123,729.80	141,419.85
Dane	315.00	490.32	805.32				318,282.01		614,102.25	753,871.39
Dodge	172.60	244.92	417.52				159,161.40		159,406.32	159,578.92
Door	1,799.40	2,374.05	4,373.45				15,149.85		17,723.90	19,523.30
Douglas							3,050.82		3,050.82	3,050.82
Dunn	2,234.40	3,066.76	5,301.16				94,715.09		107,548.95	115,058.25
Eau Claire	278.40	384.33	602.73				23,894.41		27,081.19	27,608.39
Fond du Lac	111.20	138.73	249.93				86,761.55		86,900.28	87,011.48
Forest										
Grant										
Green										
Green Lake										
Iowa	9.60	1,195.75	1,195.75				429,590.45		432,842.75	434,771.70
Jackson		34.80	44.40				145,949.03		149,731.34	151,331.69
Jefferson		1,822.34	1,322.34				55,143.54		56,339.29	56,339.29
Juneau							179,985.31		180,107.11	180,144.71
Kenosha		486.27	486.27				4,338.55		59,279.52	63,618.07
Kewaunee	239.20	361.13	620.33				49,730.28		76,010.32	80,239.16
La Crosse	206.00	307.85	513.85				66,555.75		61,012.98	61,887.93
Lafayette		1,337.84	1,337.84				58,229.24		17,333.44	17,592.64
Langlade							14,055.35		14,363.20	14,569.20
Lincoln							78,932.94		91,848.57	96,428.72
Manitowoc							247,688.32		247,688.32	247,688.32
Marathon	108.40	46.64	155.04				2,467.15		2,467.15	2,467.15
Marquette							2,801.32		2,801.32	2,801.32
Marquette							28,742.38		28,789.02	28,897.42
Milwaukee							32,084.54		32,084.54	32,084.54
Monroe							5,057.91		5,057.91	5,057.91
Monroe							48,485.24		48,631.58	48,550.18
Oconto							5,883.35		5,938.82	5,979.02
Oconto							50,595.77		67,625.19	76,445.46
Oneida							20,142.80		20,142.80	20,142.80
Outagamie							1,638.50		1,725.82	1,740.42
Ozaukee	169.00	259.40	428.40				49,356.66		49,356.66	49,356.66
Ozaukee							36,018.12		36,277.52	36,446.52

Rental and benefit payments through Dec. 31, 1934—by States and counties—Continued

WISCONSIN—Continued

County	Wheat			Tobacco			Corn-hog, 1934	All commodities		
	1933	1934	Total	1933	1934	Total		1933	1934	Total
Pepin.....		\$1,232.66	\$2,104.26				\$34,369.07	\$871.00	\$35,601.73	\$36,473.33
Pierce.....		8,948.43	8,948.43			\$3,544.75	84,471.84	1,238.95	95,726.07	96,965.02
Polk.....		1,003.50	1,003.50			368.60	41,415.73	78.00	42,709.83	42,787.83
Portage.....	109.40	251.33	420.73				24,004.16	169.40	24,255.49	24,421.89
Price.....	24.80	45.42	70.22				2,854.24	24.80	2,899.66	2,924.46
Racine.....							32,371.79		32,371.79	32,371.79
Richland.....		212.79	212.79			14,077.61	3,863.32		67,871.53	71,734.85
Rock.....	514.80	702.24	1,217.04			159,020.55	139,302.09	53,925.63	245,614.05	299,539.68
Rusk.....							2,233.05		2,233.05	2,233.05
St. Croix.....		8,952.29	15,876.89				78,204.84	6,924.60	87,157.13	94,081.73
Sauk.....	6,924.60	525.72	525.72		379.90	542.20	134,721.51	162.30	135,627.13	135,780.43
Sawyer.....							1,260.05		1,260.05	1,260.05
Shawano.....	139.60	55.98	194.98				27,114.99	139.00	27,170.97	27,309.97
Sheboygan.....	77.40	111.49	188.89				43,997.80	77.40	44,108.79	44,186.19
Taylor.....							8,932.62		8,932.62	8,932.62
Trempealeau.....		1,010.60	1,010.60			26,743.28	89,857.74	7,927.74	109,683.88	117,611.62
Vernon.....		203.24	203.24			217,618.62	48,398.53	63,993.70	202,226.69	266,220.39
Vilas.....		106.37	170.97				276.50	64.60	382.87	447.47
Walworth.....	364.60	501.47	866.07			69.00	71,498.90	433.60	72,000.37	72,433.97
Washington.....							5,126.75		5,126.75	5,126.75
Waushara.....							40,874.77		40,874.77	40,874.77
Waupesa.....							19,832.49		19,832.49	19,832.49
Waushara.....		82.80	305.86				26,630.05		26,630.05	26,630.05
Winnebago.....	223.00						22,278.50	223.00	22,361.36	22,584.36
Wood.....		163.40	163.40		30.80	74.80	45,552.14	44.00	45,852.94	45,926.94
							14,469.75		14,633.15	14,633.15
Total.....	16,441.00	40,118.52	56,559.52	343,332.44	742,824.28	1,086,156.72	3,909,797.71	359,773.44	4,692,740.51	5,052,513.95

WYOMING

County	All commodities			
	1933	1934	Total	Conflag, 1934
Albany.....				\$440.00
Big Horn.....				2,314.13
Campbell.....				28,728.65
Carbon.....				
Converse.....	\$1,069.80			
Crook.....				9,672.10
Fremont.....				13,772.60
Goshute.....				3,602.25
Hot Springs.....				53,420.61
Johnson.....				2,217.55
Laramie.....				4,184.65
Lincoln.....				44,942.25
Niobrara.....	2,955.80			5,743.20
Park.....				11,938.92
Platte.....				3,206.40
Sheridan.....				22,974.05
Sweetwater.....				6,310.05
Uinta.....				8.00
Washakie.....				428.00
Weston.....				905.05
Total.....	4,025.60	595,172.45		12,080.13
				226,888.59
				4,025.60
				\$22,061.04
				\$26,086.64

APPENDIX D—EXPENDITURES FOR REMOVAL OF SURPLUS

EXHIBIT 13

Payments for removal of surplus and drought relief through Dec. 31, 1934—Analyzed by disbursing office and commodity¹

Disbursing office	Total	Hogs	Wheat	Butter and cheese	Cattle	Sheep and goats	Seed
Washington, D. C.	\$3,033,708.41	\$1,337,923.79			\$1,095,844.62		
Atlanta, Ga.	81,119.00	81,119.00					
Chicago, Ill.	34,975,493.47	24,347,621.92		\$9,876,031.55	751,840.00		
Columbus, Ohio.	555,729.87	555,729.87					
Denver, Colo.	2,294,237.00					\$2,294,237.00	
Kansas City, Mo.	48,252,133.50				48,252,133.50		
Minneapolis, Minn.	49,083,102.09				37,256,499.00		\$11,826,603.09
Omaha, Nebr.	15,482,368.23	15,482,368.23					
Portland, Oreg.	6,079,407.57	92,180.21	\$6,057,227.36				
St. Louis, Mo.	3,825,670.65	3,825,670.65					
St. Paul, Minn.	2,738,784.77	204,323.25		2,474,461.52			
San Francisco, Calif.	3,865,143.93	116,015.93			3,749,128.00		
Total	170,296,938.49	46,062,922.85	6,057,227.36	12,350,493.07	91,705,445.12	2,294,237.00	11,826,603.09

¹ This statement reflects disbursements through cooperating War and Treasury Department disbursing offices for removal of surplus agricultural products, and for drought-relief activities. The amounts shown therein are on the basis of available accounts current received from field disbursing officers. Payments of indemnities through the Bureau of Animal Industry for diseased cattle slaughtered are included in the amount shown opposite Washington, D. C., under the heading of cattle. Payments for the purchase of purebred cattle by the Indian Service are included in the amount shown opposite Kansas City, Mo., under the heading of cattle. Amounts listed above include payments for agricultural products originating in other States as well as the State in which the disbursing office is located.

APPENDIX E—ADMINISTRATIVE EXPENDITURES

EXHIBIT 14

Summary of expenditures through Dec. 31, 1934—Analyzed by State and character

State	Total expenditures	Character of expenditures		
		General administrative	Rental and benefit	Removal of surplus
Washington, D. C.	\$19,378,743.23	\$16,344,974.82		\$3,033,768.41
Canada	105.61	105.61		
Europe	16,456.17	16,456.17		
China and Japan	7,009.09	7,009.09		
Alabama	19,789,018.75	1,483,328.11	\$18,305,690.64	
Arizona	1,037,152.45	49,753.04	987,399.41	
Arkansas	21,353,920.17	1,072,612.94	20,281,307.23	
California	7,738,372.88	335,567.51	3,537,661.44	3,865,143.93
Colorado	6,810,903.80	178,887.49	4,337,779.31	2,294,237.00
Connecticut	909,603.72	64,969.28	844,634.44	
Delaware	195,136.85	21,153.09	173,983.76	
Florida	1,026,631.43	147,653.57	878,977.86	
Georgia	19,005,327.86	1,273,468.75	17,650,740.11	81,119.00
Hawaii	13,977.92	13,977.92		
Idaho	5,661,976.11	117,822.92	5,544,153.19	
Illinois	58,223,716.95	435,278.22	22,812,945.26	34,975,493.47
Indiana	17,045,589.42	245,879.16	16,799,710.26	
Iowa	40,440,299.98	399,494.10	40,040,805.88	
Kansas	46,253,019.46	372,978.94	45,880,040.52	
Kentucky	5,468,999.04	255,072.36	5,213,926.68	
Louisiana	10,829,336.81	712,775.94	10,116,560.87	
Maine	23,756.06	21,750.06	2,006.00	
Maryland	1,706,729.23	139,562.54	1,567,166.69	
Massachusetts	653,601.65	105,774.68	547,826.97	
Michigan	2,906,731.54	177,479.44	2,729,252.10	
Minnesota	65,330,131.82	408,764.03	13,069,480.93	51,821,886.86
Mississippi	21,104,888.78	1,335,222.31	19,769,666.47	
Missouri	71,442,547.00	556,511.39	18,808,231.46	52,077,804.15
Montana	9,437,334.28	171,821.51	9,265,512.77	
Nebraska	40,374,185.97	382,751.49	24,509,066.25	15,482,368.23
Nevada	111,546.40	41,585.59	69,960.81	
New Hampshire	46,162.00	20,784.50	25,377.50	
New Jersey	284,532.54	101,988.85	182,543.69	
New Mexico	1,966,679.30	138,653.29	1,828,026.01	
New York	659,429.45	423,289.31	236,140.14	
North Carolina	14,231,894.24	1,089,915.26	13,141,978.98	
North Dakota	24,714,373.25	298,499.02	24,415,874.23	
Ohio	13,645,420.30	384,297.13	12,675,393.30	585,729.87
Oklahoma	32,275,940.33	975,629.28	31,300,311.05	
Oregon	10,439,466.90	113,544.04	4,246,515.29	6,079,407.57
Pennsylvania	1,918,529.39	299,688.22	1,618,841.17	
Puerto Rico	1,188,639.00		1,188,639.00	
Rhode Island	20,196.18	18,019.34	2,176.84	
South Carolina	13,369,475.32	936,482.22	12,432,993.10	
South Dakota	15,255,858.17	257,876.20	14,997,981.97	
Tennessee	9,264,727.43	625,655.14	8,639,072.29	
Texas	82,937,203.62	2,595,551.54	80,341,652.08	
Utah	1,175,739.24	79,002.51	1,096,736.73	
Vermont	72,435.27	31,468.47	40,966.80	
Virginia	3,004,150.88	328,729.86	2,675,421.02	
Washington	6,572,854.94	110,306.53	6,462,548.41	
West Virginia	403,644.00	104,125.58	299,518.42	
Wisconsin	5,330,777.15	278,263.20	5,052,513.95	
Wyoming	908,655.92	82,569.28	826,086.64	
Total	733,983,535.25	36,184,780.84	527,501,795.92	170,296,958.49

EXHIBIT 15

General administrative expenses through Dec. 31, 1934—Analyzed by State and character

State	Total expenses	General expenses	Cotton	Wheat
Washington, D. C.	\$16,344,974.82	\$5,044,991.67	\$4,199,748.68	\$2,251,894.41
Canada	105.61			9,021.81
Europe	16,456.17			
China and Japan	7,009.09		7,009.09	
Alabama	1,483,328.11	910.09	1,466,153.17	549.71
Arizona	49,753.04	407.33	31,582.99	9,997.08
Arkansas	1,072,612.94	24,012.09	1,006,968.40	7,767.69
California	335,567.51	51,479.79	77,922.28	81,575.18
Colorado	178,887.49	1,589.54	3,537.97	49,442.83
Connecticut	64,969.28	9,950.92	25,884.54	1,477.88
Delaware	21,153.09	2,141.04	5,264.01	3,886.10
Florida	147,653.57	908.27	91,866.04	4,563.28
Georgia	1,273,468.75	23,964.31	1,167,459.44	2,591.16
Hawaii	13,977.92	4.53	11,770.43	536.08
Idaho	117,822.92	1,241.73	2,979.89	64,952.79
Illinois	435,278.22	47,758.22	8,601.88	53,482.83
Indiana	245,879.16	6,228.95	4,260.10	60,645.15
Iowa	399,494.10	2,243.69	2,768.17	11,552.61
Kansas	372,978.94	2,175.74	2,153.39	169,885.38
Kentucky	255,072.36	7,651.63	11,902.69	27,035.46
Louisiana	712,776.94	56,463.45	615,953.80	2,136.48
Maine	21,750.06		16,570.31	515.07
Maryland	139,562.54	6,581.66	31,457.25	33,742.12
Massachusetts	105,774.68	15,973.55	68,218.77	1,334.51
Michigan	177,479.44	27,609.27	16,780.65	66,480.83
Minnesota	408,764.03	31,761.57	1,455.82	91,412.74
Mississippi	1,335,222.31	11,841.14	1,306,178.35	2,559.81
Missouri	556,511.39	21,468.25	107,121.77	106,597.21
Montana	171,821.51	22,673.69	1,468.29	99,155.32
Nebraska	332,751.49	17,732.52	1,843.47	127,287.70
Nevada	41,585.59		976.65	13,134.88
New Hampshire	20,784.50		16,136.94	1,099.86
New Jersey	101,988.85	924.00	34,904.90	10,376.39
New Mexico	138,653.29	4,318.88	40,801.30	19,696.61
New York	423,289.31	15,575.42	125,635.84	115,625.07
North Carolina	1,089,915.26	13,263.23	721,929.77	8,808.02
North Dakota	298,499.02	5,389.37	1,251.33	122,230.84
Ohio	384,297.13	397.67	25,153.88	113,726.88
Oklahoma	975,629.28	801.19	721,794.61	103,310.92
Oregon	113,544.04	3,780.42	2,598.36	64,341.37
Pennsylvania	299,688.22	12,066.09	43,322.28	40,798.95
Rhode Island	18,019.34	801.47	15,022.65	208.07
South Carolina	936,482.22	6,908.09	865,438.65	239.48
South Dakota	257,876.20	21,836.68	1,581.17	98,606.70
Tennessee	625,655.14	1,391.36	421,151.71	32,308.06
Texas	2,595,551.54	11,625.86	2,210,817.05	129,963.30
Utah	79,002.51	6,786.30	2,536.18	22,428.96
Vermont	31,468.47	542.34	15,730.55	2,852.92
Virginia	328,729.86	2,505.92	76,613.16	49,090.54
Washington	110,306.53	9,752.58	2,476.19	56,506.72
West Virginia	104,125.58	11,405.84	16,083.75	23,868.54
Wisconsin	278,263.20	24,576.29	13,318.82	20,782.57
Wyoming	82,569.28	1,227.02	2,078.66	35,716.97
Total	36,184,780.84	5,595,640.66	15,672,235.94	4,427,801.84

*General administrative expenses through Dec. 31, 1934—Analyzed by State
and character—Continued*

State	Tobacco	Corn-hog	Sugar	Cattle
Washington, D. C.	\$907,794.36	\$2,413,765.53	\$108,242.81	\$1,418,537.36
Canada		105.61		
Europe		7,434.36		
Alabama	114.07	12,504.59	356.63	2,739.85
Arizona	74.64	7,151.96	265.06	273.98
Arkansas	1,045.61	15,437.57	820.32	16,561.26
California	5,673.88	78,199.34	27,195.67	13,521.37
Colorado	74.60	83,434.94	10,475.70	30,331.91
Connecticut	21,214.48	6,149.15	67.90	224.41
Delaware	2,121.85	7,707.09	33.00	
Florida	30,696.99	10,044.96	3,122.15	6,451.88
Georgia	55,642.92	8,059.30	1,465.89	14,285.73
Hawaii	162.90	1,041.82	462.16	
Idaho	139.46	41,544.40	127.38	6,837.27
Illinois	900.51	311,410.21	303.12	12,821.45
Indiana	5,808.14	162,151.01	127.87	6,657.94
Iowa	116.25	340,416.58	197.13	42,199.67
Kansas	140.26	144,845.16	244.37	53,534.64
Kentucky	134,765.11	6,994.82	180.69	2,378.84
Louisiana	837.99	28,326.24		2,063.16
Maine	75.26	4,543.99	45.43	
Maryland	6,186.03	44,644.69	10,539.07	6,411.72
Massachusetts	5,878.42	11,068.48	1,652.09	1,648.86
Michigan	6,538.49	52,391.78	2,416.75	2,416.67
Minnesota	1,516.46	140,622.07	136.89	141,858.48
Mississippi	630.65	3,519.78	276.63	10,215.95
Missouri	6,123.15	198,403.37	189.53	116,608.11
Montana	121.42	25,144.84	115.88	23,142.07
Nebraska	93.11	209,617.84	182.60	25,994.25
Nevada	758.90	7,526.53	1,812.62	17,376.01
New Hampshire	389.86	3,143.73	14.11	
New Jersey	20,323.46	35,203.78	249.97	6.35
New Mexico	417.62	13,316.58	953.07	59,149.23
New York	37,055.43	62,791.63	47,412.63	19,193.29
North Carolina	327,352.01	17,972.08	32.86	557.29
North Dakota	54.83	56,610.18	58.27	112,924.20
Ohio	44,732.35	189,937.37	793.99	9,554.99
Oklahoma	262.64	70,995.21	401.50	78,063.21
Oregon	107.08	39,736.66	193.20	2,786.95
Pennsylvania	37,113.50	63,136.50	31,714.10	71,536.80
Rhode Island	43.82	1,934.97	8.36	
South Carolina	57,289.77	4,863.86	152.93	1,589.44
South Dakota	88.56	135,247.28	134.64	381.17
Tennessee	69,426.65	82,822.14	164.72	18,390.50
Texas	1,052.99	72,713.84	3,768.99	165,609.51
Utah	61.96	17,636.93	8,696.75	20,855.43
Vermont	209.61	9,862.03	93.38	2,177.64
Virginia	105,598.19	66,709.14	2,763.41	25,449.50
Washington	134.89	34,410.56	415.16	6,610.43
West Virginia	15,702.20	31,750.34	365.92	4,948.99
Wisconsin	42,021.13	123,007.58	675.75	53,881.05
Wyoming	196.20	22,579.77	378.70	20,391.96
Total	1,954,860.66	5,583,421.97	301,668.99	2,649,150.78

EXHIBIT 16

General administrative expenses through Dec. 31, 1934

1. BY OBJECTIVE CLASSIFICATION

	Total	Washington, D. C.	Field
Salaries.....	\$30,071,070.24	\$12,442,434.73	\$17,628,635.51
Other expenses:			
Supplies.....	708,502.83	589,290.41	119,212.42
Communications.....	272,443.00	189,098.78	83,344.22
Travel.....	2,719,850.96	993,796.37	1,726,054.59
Transportation of things.....	50,625.70	34,358.93	16,266.77
Printing and binding.....	959,472.18	957,984.30	1,487.88
Rents.....	332,645.64	301,260.10	31,385.54
Equipment.....	786,662.38	576,923.95	209,738.43
Miscellaneous.....	283,507.91	259,827.25	23,680.66
Total other expenses.....	6,113,710.60	3,902,540.09	2,211,170.51
Total.....	36,184,780.84	16,344,974.82	19,839,806.02

2. BY AGRICULTURAL ADJUSTMENT ADMINISTRATION AND COOPERATING AGENCIES

	Total	Washington, D. C.	Field
Agricultural Adjustment Administration.....	\$15,621,849.04	\$15,205,147.34	\$416,701.70
Bureau of Agricultural Economics.....	1,092,890.97	176,788.67	916,102.30
Bureau of Animal Industry.....	1,357,437.38	15,375.82	1,342,061.56
Bureau of Dairy Industry.....	760.00	380.00	380.00
Bureau of Census.....	841.50	841.50	-----
Bureau of Chemistry and Soils.....	4,228.28	2,410.92	1,817.33
Bureau of Entomology.....	2,837.86	-----	2,837.86
Bureau of Internal Revenue.....	4,023,736.69	754,339.48	3,269,397.21
Bureau of Labor Statistics.....	4,423.61	4,423.61	-----
Bureau of Plant Industry.....	20,708.95	2,179.95	18,529.00
Extension Service.....	13,949,630.79	82,129.27	13,867,501.52
Federal Trade Commission.....	747.11	747.11	-----
Interior Department.....	4,972.33	1,817.93	3,154.40
Office of Exhibits.....	6,663.49	6,663.49	-----
Secretary's Office.....	23,047.81	23,047.81	-----
Treasurer of the United States.....	68,334.12	68,334.12	-----
War Department.....	1,670.94	347.80	1,323.14
Total.....	36,184,780.84	16,344,974.82	19,839,806.02

¹ Includes expenditures of \$1,178,572.03 for Field Audit Section of Comptroller's Office.

APPENDIX F—MARKETING AGREEMENTS, LICENSES, AND CODES

EXHIBIT 17

Marketing agreements in effect as of Dec. 31, 1934

	Date effective	Effective date of marketing agreement replaced
Alcoholic beverage importing.....	Dec. 1, 1933	
Apples, Gravenstein.....	Aug. 5, 1934	
Asparagus, California fresh.....	Mar. 17, 1934	
Bee shippers.....	May 6, 1934	
Celery, Florida.....	Apr. 28, 1934	
Citrus:		
California.....	Dec. 14, 1933	Dec. 14, 1933
Florida.....	Dec. 18, 1934	
Texas.....	Dec. 26, 1933	
Date shippers, California.....	June 8, 1934	
Deciduous tree fruits:		
Except apples, California.....	Sept. 2, 1933	
Northwest.....	Oct. 14, 1933	
Grapes, Tokay.....	Sept. 30, 1933	
Gum-turpentine and gum-rosin processors.....	Feb. 21, 1934	
Milk:		
Dry skim.....	Sept. 16, 1933	
Evaporated.....	Sept. 9, 1933	
Olives, California canned.....	Dec. 13, 1933	
Peaches:		
California cling.....	July 6, 1934	Aug. 17, 1933
Colorado fresh.....	Nov. 6, 1934	
Potatoes, eastern.....	July 13, 1934	
Prunes, dried California.....	Aug. 17, 1934	
Raisins, California.....	May 29, 1934	
Rice:		
California.....	Sept. 26, 1933	Oct. 16, 1933
Southern.....	Mar. 6, 1934	
Strawberries, Florida.....	Aug. 3, 1934	
Tobacco, Connecticut shade grown.....	Dec. 11, 1933	
Vegetables, Washington.....	July 21, 1934	
Walnut packers.....	Oct. 9, 1933	
Watermelons, southeastern.....	Aug. 10, 1934	
Wheat, North Pacific.....	Oct. 11, 1933	

EXHIBIT 18

Licenses in effect as of Dec. 31, 1934

	Date effective	Effective date of license replaced
Alcoholic beverage importing industry.....	Dec. 10, 1933	
Apples, California Gravenstein.....	Aug. 20, 1934	
Asparagus:		
California canned.....	Mar. 6, 1934	
California fresh.....	Mar. 20, 1934	
Bee shippers.....	May 6, 1934	
Celery, Florida.....	May 1, 1934	
Citrus:		
California.....	Dec. 18, 1933	Dec. 18, 1933
Florida.....	do.....	
Texas.....	Dec. 26, 1933	
Date shippers.....	June 11, 1934	
Deciduous tree fruits:		
California.....	Oct. 9, 1933	
Northwest.....	Oct. 28, 1933	

Licenses in effect as of Dec. 31, 1934—Continued

	Date effective	Effective date of license replaced
Grapes, Tokay.....	Oct. 14, 1933	
Gum-turpentine and gum-rosin agents, factors, and commission merchants.....	July 14, 1934	
Gum-turpentine and gum-rosin distributors.....	do.....	
Gum-turpentine and gum-rosin processors.....	Mar. 13, 1934	
Milk:		
Alameda Co. (Oakland).....	July 1, 1934	Nov. 14, 1933
Ann Arbor.....	do.....	
Atlanta.....	Dec. 1, 1934	
Baltimore.....	Aug. 1, 1934	Sept. 29, 1933
Battle Creek.....	July 1, 1934	
Bay City.....	do.....	
Boston, Greater.....	Mar. 16, 1934	Nov. 3, 1933
Chicago.....	Feb. 5, 1934	Aug. 1, 1933
Denver.....	Sept. 1, 1934	
Des Moines.....	Feb. 14, 1934	Oct. 28, 1933
Detroit.....	Apr. 1, 1934	Aug. 27, 1933
Dubuque.....	Dec. 5, 1934	
Evansville.....	Feb. 26, 1934	Oct. 23, 1933
Fall River.....	Apr. 1, 1934	
Flint.....	July 1, 1934	
Fort Wayne.....	do.....	
Fort Worth.....	Sept. 1, 1934	
Grand Rapids.....	July 1, 1934	
Indianapolis.....	Apr. 1, 1934	
Kansas City, Greater.....	Mar. 17, 1934	
Kalamazoo.....	July 1, 1934	
Lansing.....	do.....	
Leavenworth.....	May 16, 1934	
Lexington.....	May 2, 1934	
Lincoln.....	Mar. 17, 1934	
Louisville.....	June 1, 1934	
Los Angeles.....	do.....	Nov. 20, 1933
Muskegon.....	July 1, 1934	
New Bedford.....	Apr. 1, 1934	
Newport.....	do.....	
Oklahoma.....	June 16, 1934	
Omaha-Concord Bluffs.....	Feb. 23, 1934	
Philadelphia.....	Aug. 25, 1933	
Phoenix.....	Nov. 10, 1934	
Port Huron.....	July 1, 1934	
Providence.....	Apr. 1, 1934	
Quad Cities.....	June 1, 1934	
Richmond.....	May 1, 1934	Dec. 20, 1933
Saginaw.....	July 1, 1934	
San Diego.....	Dec. 18, 1933	
San Francisco.....	Oct. 2, 1934	
Savannah.....	Aug. 16, 1934	
Sioux City.....	Mar. 17, 1934	
Southern Illinois.....	Nov. 1, 1934	
St. Louis.....	Mar. 2, 1934	Nov. 25, 1933
Topeka.....	Nov. 10, 1934	
Tulsa.....	Aug. 21, 1934	
Twin Cities.....	Feb. 16, 1934	Sept. 2, 1933
Wichita.....	Mar. 17, 1934	
Olive canner, California.....	Dec. 13, 1933	
Peaches, California cling.....	July 12, 1934	Aug. 17, 1933
Potatoes, eastern.....	July 14, 1934	
Prunes, dried California.....	Aug. 17, 1934	
Raisins, California.....	May 31, 1934	
Rice milling, southern.....	Oct. 17, 1933	
Rice, California.....	Dec. 21, 1934	
Strawberries, Florida.....	Aug. 20, 1934	
Tobacco, Connecticut shade grown.....	Jan. 17, 1934	
Vegetables, western Washington.....	July 21, 1934	
Watermelon, southeastern.....	Aug. 20, 1934	
Walnut packers.....	Oct. 11, 1933	
Wood-turpentine and wood-rosin processors.....	May 13, 1934	

EXHIBIT 19

Codes in effect as of Dec. 31, 1934

	Date effective
Alcoholic beverage importing industry ¹	Dec. 3, 1933
Alcoholic beverage wholesale industry ¹	Dec. 10, 1933
Antihog cholera serum and hog cholera virus industry.....	Mar. 9, 1934
Brewing industry ¹	Dec. 5, 1933
Commercial and breeder hatchery.....	Jan. 1, 1934
Dates, imported ²	Nov. 20, 1933
Distilled spirits ¹	Nov. 27, 1933
Distilled spirits rectifying industry ¹	Dec. 10, 1933
Feed manufacturing.....	June 4, 1934
Fruits and vegetables, wholesale.....	July 16, 1934
Grain Exchange.....	Mar. 20, 1934
Grain elevators, country.....	May 21, 1934
Linseed oil manufacturing.....	Apr. 30, 1934
Poultry, New York live.....	Apr. 23, 1934
Rice, milling, southern.....	Dec. 1, 1933
Tobacco, auction and loose-leaf.....	July 9, 1934
Wheat-flour industry.....	June 13, 1934
Wine industry, domestic ¹	Dec. 28, 1933

¹ Transferred to F. A. C. A.² Transferred to N. R. A.

APPENDIX G—ADJUSTMENT CONTRACTS

EXHIBIT 20

Number of adjustment contracts accepted by commodities and by States as of Dec. 31, 1934

State	Total all commodities	Wheat	Cotton		Tobacco	Corn-hog	Sugar
			1933	1934			
UNITED STATES.....	4, 016, 477	579, 418	1, 031, 536	990, 865	270, 870	1, 143, 647	201
Alabama.....	265, 123		140, 775	121, 497	24	2, 827	
Arizona.....	2, 967	114	702	1, 845		306	
Arkansas.....	202, 348	41	99, 768	91, 721	5	10, 813	
California.....	9, 241	2, 241	391	1, 858		4, 751	
Colorado.....	24, 514	11, 863				12, 651	
Connecticut.....	2, 064				1, 942	92	
Delaware.....	913	686				227	
Florida.....	13, 695		4, 437	6, 398	1, 272	1, 538	
Georgia.....	215, 658	31	97, 296	105, 358	12, 420	553	
Idaho.....	24, 241	14, 779				9, 462	
Illinois.....	141, 735	23, 982			13	117, 740	
Indiana.....	110, 004	24, 041			2, 412	83, 551	
Iowa.....	176, 428	3, 700				172, 728	
Kansas.....	172, 073	94, 061	27	15	80	77, 890	
Kentucky.....	97, 864	3, 970	88	237	70, 865	22, 654	
Louisiana.....	118, 054		62, 130	55, 373		470	81
Maine.....	7					7	
Maryland.....	11, 483	7, 741			700	3, 042	
Massachusetts.....	1, 233				1, 001	232	
Michigan.....	38, 049	13, 981				24, 068	
Minnesota.....	100, 939	21, 729			532	78, 678	
Mississippi.....	203, 625		108, 533	94, 843		249	
Missouri.....	143, 234	16, 149	8, 972	8, 609	895	108, 609	
Montana.....	43, 335	39, 114				4, 221	
Nebraska.....	122, 091	34, 038				88, 053	
Nevada.....	586	303				283	
New Hampshire.....	208				26	182	
New Jersey.....	496	192				304	
New Mexico.....	7, 836	1, 684	1, 614	2, 056		2, 482	
New York.....	2, 775	539			349	1, 837	
North Carolina.....	201, 717	1, 058	49, 990	69, 697	77, 071	3, 901	
North Dakota.....	123, 067	104, 326				18, 741	
Ohio.....	97, 364	23, 854			8, 637	64, 873	
Oklahoma.....	237, 834	29, 066	87, 807	84, 039		36, 922	
Oregon.....	13, 090	7, 078				6, 012	
Pennsylvania.....	10, 344	3, 418			4, 304	2, 622	
Rhode Island.....	10					10	
South Carolina.....	153, 846		68, 456	70, 515	13, 250	1, 625	
South Dakota.....	106, 240	49, 590				56, 050	
Tennessee.....	142, 948	2, 273	46, 608	38, 551	32, 139	23, 377	
Texas.....	530, 602	14, 423	250, 770	233, 613		31, 796	
Utah.....	8, 477	5, 627				2, 730	120
Vermont.....	566				24	542	
Virginia.....	49, 523	7, 648	3, 172	4, 590	23, 683	10, 430	
Washington.....	16, 457	11, 490				4, 967	
West Virginia.....	4, 373	972			1, 299	2, 102	
Wisconsin.....	51, 503	1, 203			7, 500	42, 800	
Wyoming.....	5, 360	2, 363				2, 997	
Puerto Rico.....	10, 367				10, 367		

APPENDIX H—INFORMATIVE PUBLICATIONS

EXHIBIT 21

AGRICULTURAL ADJUSTMENT PUBLICATIONS OF GENERAL INTEREST

- The Agricultural Adjustment Act and Its Operation.—Explains the Act and policy adopted by the Administration for its operation. Issued October 1933 and revised August 1934. 13 pages. G-1.
- Compilation of Agricultural Adjustment Act as Amended and Acts Relating Thereto as of June 29, 1934. 105 pages. *10 cents.
- Achieving A Balanced Agriculture.—Deals with the why and how of agricultural adjustment. Issued August 1934. 52 pages. G-20.
- The Farmers Run Their Show.—Deals with the results of a survey to discover what is happening in the operation of adjustment programs. Issued in 1934. 13 pages. G-18.
- Agriculture's Interest In America's World Trade.—Deals with questions and answers concerning the size of the Nation's agricultural plant, exports, efforts to revive export trade, and prospects for increased exports of agricultural commodities. Issued January 1935. 22 pages. G-26.
- Relation of Farm Purchasing Power, General Recovery, and Northeastern Agriculture.—Presents some of the major economic relationships between the welfare of the Northeastern States and the agricultural and industrial conditions of the United States as a whole. Issued November 1934. 15 pages.
- The Facts About Wheat.—A review of the wheat situation as it affects wheat growers of the United States. Issued January 1935. 28 pages. Wheat Circular No. 1.
- Corn-Hog Adjustment.—A handbook for use in the corn-hog adjustment program. Issued January 1935. 103 pages. C. H.—113.
- Safer Markets and Better Prices for Milk Producers.—Describes the objectives of milk licenses issued under the Act. Issued September 1934. 7 pages. G-22.

COTTON LEAFLET SERIES

- Adjusting Cotton Production.—Deals with efforts under the Act to adjust cotton production. Issued 1934. 6 pages. Cotton Leaflet No. 1.
- The Cotton Processing Tax.—Questions and answers concerning the processing tax on cotton. Issued October 1934. 4 pages. Cotton Leaflet No. 2.
- Foreign Cotton Production and the American Markets Abroad.—Contains questions and answers on foreign production and market outlook for cotton. Issued October 1934. 8 pages. Cotton Leaflet No. 3.
- America's Cotton Production Problem for 1935.—Questions and answers concerning the supply, consumption, and acreage of American cotton. Issued October 1934. 3 pages. Cotton Leaflet No. 4.
- Shall the Bankhead Act Be Continued Through 1935.—A discussion of factors in the cotton situation and the purpose of the Bankhead Act. Issued November 1934. 8 pages. Cotton Leaflet No. 5.
- Adjustment for Sugar Beets.—A summary of the sugar-beet adjustment program. Issued October 18, 1934. 6 pages. G-28.

* Make remittance to Superintendent of Documents, Washington, D. C.

APPENDIX I—PRODUCTION ADJUSTMENT CONTRACTS

EXHIBIT 22

PRODUCTION ADJUSTMENT CONTRACTS, EMERGENCY LIVESTOCK AGREEMENTS, AND RIDERS

COTTON

- 1934 and 1935 Cotton Acreage Reduction Contract.—Issued November 1933.
Form No. Cotton 1.
1934 and 1935 Cotton Acreage Reduction Contract as Entered Into in 1935.—
Issued February 1935. Form No. Cotton 101.

CORN-HOGS

- Corn-Hog Reduction Contract.—Issued December 1933. Form No. C. H.-8.
Rider A To Corn-Hog Reduction Contract.—Form No. C. H.-8e.
Rider 2 To Be Attached to Page 4 of Corn-Hog Reduction Contract If Early
First Installment Has Been Requested by Producer.—Issued February 1934.
Form No. C. H.-8d.
1935 Corn-Hog Contract.—Issued December 1934. Form No. C. H.-101.
Rider A To 1935 Corn-Hog Contract.—Form No. C. H.-101c.

WHEAT

- Wheat Allotment Contract.—W-3.

TOBACCO

- New England Types 51 and 52 Tobacco Acreage Reduction Contract.—Form T-1.
Rider A, Tobacco Acreage Adjustment Contract, New England Types 51 and
52.—Form T-92.
Pennsylvania Type 41 and New York-Pennsylvania Type 53 Tobacco Acreage
Reduction Contract.—Form T-2.
Rider A, Tobacco Acreage Reduction Contract, Pennsylvania Type 41 and
New York-Pennsylvania Type 53.—Form T-90.
Miami Valley Types 42, 43, and 44 Tobacco Acreage Reduction Contract.—
Form T-3.
Rider A, Tobacco Acreage Reduction Contract, Miami Valley Types 42, 43,
and 44.—Form T-91.
Wisconsin Types 54 and 55 Tobacco Acreage Reduction Contract.—Form T-4.
Rider A, Tobacco Acreage Reduction Contract, Wisconsin Types 54 and 55.—
Form T-93.
Georgia-Florida Type 62 Tobacco Production Adjustment Contract.—Form
T-10.
Georgia-Florida Type 62 Tobacco Production Adjustment Contract.—Form
T-78a.
Supplement to Tobacco Production Adjustment Contract Georgia-Florida Type
62.—Form T-80.
Supplement to Cigar Tobacco Production Adjustment Contract.—Form T-79.
Flue-Cured Types 11, 12, 13, and 14, Tobacco Production Adjustment Con-
tract.—Form T-30a.
Tobacco Production Adjustment Contract Supplement, Flue-Cured Types 11,
12, 13, and 14.—Form T-32.
Burley Type 31 Tobacco Production Adjustment Contract.—Form T-39.
Supplement to Burley Type 31 Tobacco Production Adjustment Contract.—
Form T-40.
Fire-Cured Types 21, 22, 23, and 24. Tobacco Production Adjustment Con-
tract.—Form T-43.
Supplement to Fire-Cured Tobacco Production Adjustment Contract.—Form
T-44.

Dark Air-Cured Types 35, 36, and 37 Tobacco Production Adjustment Contract.—Form T-45.
Supplement to Dark Air-Cured Tobacco Production Adjustment Contract.—Form T-46.
Rider B, Tobacco Production Adjustment Contract, Burley Type 31, Fire-Cured Types 21, 22, and 23, or Dark Air-Cured Types 35, 36, and 37.—Form T-164.
Maryland Type 32 Tobacco Adjustment Contract.—Form No. T-49a.

PEANUTS

Peanut Production Adjustment Contract.—Issued November 1934. Form PN-1.
Peanut Production Adjustment Contract Supplement.—Issued November 1934. Form PN-2.

SUGAR

Sugarcane Production Adjustment Contract.—Issued November 1934. Form Sugar 103.
Sugar Beet Production Adjustment Contract.—Issued October 1934. Form Sugar 3.
Supplement to Sugar Beet Production Adjustment Contract.—Issued October 1934. Form Sugar 3-C.

CATTLE AND SHEEP

Public Voucher and Emergency Cattle Agreement.—Issued June 1934. Form No. Cattle 2.
Rider 1 to Public Voucher and Emergency Cattle Agreement.—Form No. Cattle 2d.
Public Voucher and Emergency Livestock Agreement.—Issued August 1934. Form Sheep 1.

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